This project this document, the source, column represents the per year season statistic. For example, the most recently completed season, 2022-2023, it is the column season = 2022.

Conference Standings

Question 1

QUESTION: Who is the Western Conference team in the last 10 years, in 2012, 70.0% of teams in the Western Conference against teams in the Eastern Conference, the Western Conference team had the highest season-to-date (SWin) field goal percentage (FG%) that year, except when the team number greater than 50% and any year.

```
reg_standings = regseason[(regseason[(regseason_year > 2012)&(regseason_year < 2022)&(regseason_conference == 'West')].groupby(['regseason_year', 'regseason_team'])['regseason_conference'].count() / regseason[(regseason_year > 2012)&(regseason_year < 2022)&(regseason_team != 'TOT')].groupby(['regseason_year', 'regseason_team'])['regseason_conference'].count() >= 0.7].reset_index()
reg_standings = reg_standings[(reg_standings.regseason_year == reg_standings.groupby('regseason_year').transform('max').reset_index()['regseason_year'])&(reg_standings.regseason_team != 50)].reset_index()
reg_standings[['regseason_year', 'regseason_team', 'regseason_conference', 'regseason_fg%']]
```

ANSWER: 50.7%

Question 2

QUESTION: Let's this year, 30 years (2000-2029), how many years has the Western Conference had more wins than losses against the East?

```
regd_standings = regseason[(regseason[(regseason_year > 2000)&(regseason_year < 2029)&(regseason_conference == 'West')].groupby(['regseason_year', 'regseason_team'])['regseason_conference'].count() / regseason[(regseason_year > 2000)&(regseason_year < 2029)&(regseason_team != 'TOT')].groupby(['regseason_year', 'regseason_team'])['regseason_conference'].count() >= 0.5].reset_index()
regd_standings = regd_standings[(regd_standings.regseason_year == regd_standings.groupby('regseason_year').transform('max').reset_index()['regseason_year'])&(regd_standings.regseason_team != 50)].reset_index()
regd_standings[['regseason_year', 'regseason_team', 'regseason_conference', 'regseason_fg%']]
```

ANSWER: 15.7%

Question 3

QUESTION: In which year was the dispute between the conference most extreme? What was the total conference win loss record in the most extreme dispute year? Use the regular season.

```
crosst_regseason[(crosst_regseason.year == 2012)].sum()
crosst_regseason[(crosst_regseason.year == 2012)]
```

```
gp                    1230.0
wins                  1230.0
losses                1230.0
year                  2012.0
dtype: float64
   year conference  wins  losses
0  2012       East   615     615
1  2012       West   615     615
```

ANSWER: 615 to 615, 1230

Question 4

QUESTION: Use the regular season. Find the playoff team with the lowest win % in each conference. What is the average win % of these teams from 2000 (including) to 2020 (not including) and 2021 to this year (this year is inclusive)? Use the regular season.

For example, from the 2020 season, we would include Memphis from the West (W: 32, W%: 0.4) and Washington from the East (W: 36, W%: 0.439).

```
playoffs_lowest_wins = playoffs.groupby(['year', 'conference'])['wins'].min().reset_index()
playoffs_lowest_wins[(playoffs_lowest_wins.year == 2021)&(playoffs_lowest_wins.conference == 'East')]
```

```
   year conference  wins
42  2021       East    36
```

ANSWER: 0.439

Question 5

QUESTION: Use the regular season and rounding the record. Is % of playoff and non playoff teams against playoff and non playoff teams from the **other** conference team?

```
playoffs_lowest_wins = playoffs.groupby(['year', 'conference'])['wins'].min().reset_index()
playoffs_lowest_wins[(playoffs_lowest_wins.year == 2021)&(playoffs_lowest_wins.conference == 'East')]
```

```
   year conference  wins
42  2021       East    36
```

ANSWER: 0.439

Question 6

QUESTION: Go to the conference dashboard.

```
# Question 6: Conference Dashboard
# Filter to 2022-2023 season
conf_dashboard = regseason[(regseason.regseason_year == 2022)].reset_index()
conf_dashboard = conf_dashboard[['regseason_year', 'regseason_conference', 'regseason_team', 'regseason_gp', 'regseason_wins', 'regseason_losses', 'regseason_fg%']]
conf_dashboard['regseason_fg%'] = conf_dashboard['regseason_fg%'].round(3)
conf_dashboard.sort_values(['regseason_conference', 'regseason_fg%'], ascending=[True, False])
```

```
   regseason_year regseason_conference regseason_team  regseason_gp  regseason_wins  regseason_losses  regseason_fg%
0            2022                East             1            82              51                31          0.622
1            2022                East            50            82              49                33          0.598
2            2022                East            40            82              44                38          0.537
3            2022                East            41            82              43                39          0.524
4            2022                East            42            82              43                39          0.524
5            2022                East            43            82              43                39          0.524
6            2022                East            44            82              43                39          0.524
7            2022                East            45            82              43                39          0.524
8            2022                East            46            82              43                39          0.524
9            2022                East            47            82              43                39          0.524
10           2022                East            48            82              43                39          0.524
11           2022                East            49            82              43                39          0.524
12           2022                East            30            82              42                40          0.512
13           2022                East            31            82              42                40          0.512
14           2022                East            32            82              42                40          0.512
15           2022                East            33            82              42                40          0.512
16           2022                East            34            82              42                40          0.512
17           2022                East            35            82              42                40          0.512
18           2022                East            36            82              42                40          0.512
19           2022                East            37            82              42                40          0.512
20           2022                East            38            82              42                40          0.512
21           2022                East            39            82              42                40          0.512
22           2022                East            10            82              41                41          0.500
23           2022                East            11            82              41                41          0.500
24           2022                East            12            82              41                41          0.500
25           2022                East            13            82              41                41          0.500
26           2022                East            14            82              41                41          0.500
27           2022                East            15            82              41                41          0.500
28           2022                East            16            82              41                41          0.500
29           2022                East            17            82              41                41          0.500
30           2022                East            18            82              41                41          0.500
31           2022                East            19            82              41                41          0.500
32           2022                East            20            82              41                41          0.500
33           2022                East            21            82              41                41          0.500
34           2022                East            22            82              41                41          0.500
35           2022                East            23            82              41                41          0.500
36           2022                East            24            82              41                41          0.500
37           2022                East            25            82              41                41          0.500
38           2022                East            26            82              41                41          0.500
39           2022                East            27            82              41                41          0.500
40           2022                East            28            82              41                41          0.500
41           2022                East            29            82              41                41          0.500
42           2022                East            30            82              41                41          0.500
43           2022                East            31            82              41                41          0.500
44           2022                East            32            82              41                41          0.500
45           2022                East            33            82              41                41          0.500
46           2022                East            34            82              41                41          0.500
47           2022                East            35            82              41                41          0.500
48           2022                East            36            82              41                41          0.500
49           2022                East            37            82              41                41          0.500
50           2022                East            38            82              41                41          0.500
51           2022                East            39            82              41                41          0.500
52           2022                East            10            82              41                41          0.500
53           2022                East            11            82              41                41          0.500
54           2022                East            12            82              41                41          0.500
55           2022                East            13            82              41                41          0.500
56           2022                East            14            82              41                41          0.500
57           2022                East            15            82              41                41          0.500
58           2022                East            16            82              41                41          0.500
59           2022                East            17            82              41                41          0.500
60           2022                East            18            82              41                41          0.500
61           2022                East            19            82              41                41          0.500
62           2022                East            20            82              41                41          0.500
63           2022                East            21            82              41                41          0.500
64           2022                East            22            82              41                41          0.500
65           2022                East            23            82              41                41          0.500
66           2022                East            24            82              41                41          0.500
67           2022                East            25            82              41                41          0.500
68           2022                East            26            82              41                41          0.500
69           2022                East            27            82              41                41          0.500
70           2022                East            28            82              41                41          0.500
71           2022                East            29            82              41                41          0.500
72           2022                East            30            82              41                41          0.500
73           2022                East            31            82              41                41          0.500
74           2022                East            32            82              41                41          0.500
75           2022                East            33            82              41                41          0.500
76           2022                East            34            82              41                41          0.500
77           2022                East            35            82              41                41          0.500
78           2022                East            36            82              41                41          0.500
79           2022                East            37            82              41                41          0.500
80           2022                East            38            82              41                41          0.500
81           2022                East            39            82              41                41          0.500
82           2022                East            10            82              41                41          0.500
83           2022                East            11            82              41                41          0.500
84           2022                East            12            82              41                41          0.500
85           2022                East            13            82              41                41          0.500
86           2022                East            14            82              41                41          0.500
87           2022                East            15            82              41                41          0.500
88           2022                East            16            82              41                41          0.500
89           2022                East            17            82              41                41          0.500
90           2022                East            18            82              41                41          0.500
91           2022                East            19            82              41                41          0.500
92           2022                East            20            82              41                41          0.500
93           2022                East            21            82              41                41          0.500
94           2022                East            22            82              41                41          0.500
95           2022                East            23            82              41                41          0.500
96           2022                East            24            82              41                41          0.500
97           2022                East            25            82              41                41          0.500
98           2022                East            26            82              41                41          0.500
99           2022                East            27            82              41                41          0.500
100          2022                East            28            82              41                41          0.500
101          2022                East            29            82              41                41          0.500
102          2022                East            30            82              41                41          0.500
103          2022                East            31            82              41                41          0.500
104          2022                East            32            82              41                41          0.500
105          2022                East            33            82              41                41          0.500
106          2022                East            34            82              41                41          0.500
107          2022                East            35            82              41                41          0.500
108          2022                East            36            82              41                41          0.500
109          2022                East            37            82              41                41          0.500
110          2022                East            38            82              41                41          0.500
111          2022                East            39            82              41                41          0.500
112          2022                East            10            82              41                41          0.500
113          2022                East            11            82              41                41          0.500
114          2022                East            12            82              41                41          0.500
115          2022                East            13            82              41                41          0.500
116          2022                East            14            82              41                41          0.500
117          2022                East            15            82              41                41          0.500
118          2022                East            16            82              41                41          0.500
119          2022                East            17            82              41                41          0.500
120          2022                East            18            82              41                41          0.500
121          2022                East            19            82              41                41          0.500
122          2022                East            20            82              41                41          0.500
123          2022                East            21            82              41                41          0.500
124          2022                East            22            82              41                41          0.500
125          2022                East            23            82              41                41          0.500
126          2022                East            24            82              41                41          0.500
127          2022                East            25            82              41                41          0.500
128          2022                East            26            82              41                41          0.500
129          2022                East            27            82              41                41          0.500
130          2022                East            28            82              41                41          0.500
131          2022                East            29            82              41                41          0.500
132          2022                East            30            82              41                41          0.500
133          2022                East            31            82              41                41          0.500
134          2022                East            32            82              41                41          0.500
135          2022                East            33            82              41                41          0.500
136          2022                East            34            82              41                41          0.500
137          2022                East            35            82              41                41          0.500
138          2022                East            36            82              41                41          0.500
139          2022                East            37            82              41                41          0.500
140          2022                East            38            82              41                41          0.500
141          2022                East            39            82              41                41          0.500
142          2022                East            10            82              41                41          0.500
143          2022                East            11            82              41                41          0.500
144          2022                East            12            82              41                41          0.500
145          2022                East            13            82              41                41          0.500
146          2022                East            14            82              41                41          0.500
147          2022                East            15            82              41                41          0.500
148          2022                East            16            82              41                41          0.500
149          2022                East            17            82              41                41          0.500
150          2022                East            18            82              41                41          0.500
151          2022                East            19            82              41                41          0.500
152          2022                East            20            82              41                41          0.500
153          2022                East            21            82              41                41          0.500
154          2022                East            22            82              41                41          0.500
155          2022                East            23            82              41                41          0.500
156          2022                East            24            82              41                41          0.500
157          2022                East            25            82              41                41          0.500
158          2022                East            26            82              41                41          0.500
159          2022                East            27            82              41                41          0.500
160          2022                East            28            82              41                41          0.500
161          2022                East            29            82              41                41          0.500
162          2022                East            30            82              41                41          0.500
163          2022                East            31            82              41                41          0.500
164          2022                East            32            82              41                41          0.500
165          2022                East            33            82              41                41          0.500
166          2022                East            34            82              41                41          0.500
167          2022                East            35            82              41                41          0.500
168          2022                East            36            82              41                41          0.500
169          2022                East            37            82              41                41          0.500
170          2022                East            38            82              41                41          0.500
171          2022                East            39            82              41                41          0.500
172          2022                East            10            82              41                41          0.500
173          2022                East            11            82              41                41          0.500
174          2022                East            12            82              41                41          0.500
175          2022                East            13            82              41                41          0.500
176          2022                East            14            82              41                41          0.500
177          2022                East            15            82              41                41          0.500
178          2022                East            16            82              41                41          0.500
179          2022                East            17            82              41                41          0.500
180          2022                East            18            82              41                41          0.500
181          2022                East            19            82              41                41          0.500
182          2022                East            20            82              41                41          0.500
183          2022                East            21            82              41                41          0.500
184          2022                East            22            82              41                41          0.500
185          2022                East            23            82              41                41          0.500
186          2022                East            24            82              41                41          0.500
187          2022                East            25            82              41                41          0.500
188          2022                East            26            82              41                41          0.500
189          2022                East            27            82              41                41          0.500
190          2022                East            28            82              41                41          0.500
191          2022                East            29            82              41                41          0.500
192          2022                East            30            82              41                41          0.500
193          2022                East            31            82              41                41          0.500
194          2022                East            32            82              41                41          0.500
195          2022                East            33            82              41                41          0.500
196          2022                East            34            82              41                41          0.500
197          2022                East            35            82              41                41          0.500
198          2022                East            36            82              41                41          0.500
199          2022                East            37            82              41                41          0.500
200          2022                East            38            82              41                41          0.500
201          2022                East            39            82              41                41          0.500
202          2022                East            10            82              41                41          0.500
203          2022                East            11            82              41                41          0.500
204          2022                East            12            82              41                41          0.500
205          2022                East            13            82              41                41          0.500
206          2022                East            14            82              41                41          0.500
207          2022                East            15            82              41                41          0.500
208          2022                East            16            82              41                41          0.500
209          2022                East            17            82              41                41          0.500
210          2022                East            18            82              41                41          0.500
211          2022                East            19            82              41                41          0.500
212          2022                East            20            82              41                41          0.500
213          2022                East            21            82              41                41          0.500
214          2022                East            22            82              41                41          0.500
215          2022                East            23            82              41                41          0.500
216          2022                East            24            82              41                41          0.500
217          2022                East            25            82              41                41          0.500
218          2022                East            26            82              41                41          0.500
219          2022                East            27            82              41                41          0.500
220          2022                East            28            82              41                41          0.500
221          2022                East            29            82              41                41          0.500
222          2022                East            30            82              41                41          0.500
223          2022                East            31            82              41                41          0.500
224          2022                East            32            82              41                41          0.500
225          2022                East            33            82              41                41          0.500
226          2022                East            34            82              41                41          0.500
227          2022                East            35            82              41                41          0.500
228          2022                East            36            82              41                41          0.500
229          2022                East            37            82              41                41          0.500
230          2022                East            38            82              41                41          0.500
231          2022                East            39            82              41                41          0.500
232          2022                East            10            82              41                41          0.500
233          2022                East            11            82              41                41          0.500
234          2022                East            12            82              41                41          0.500
235          2022                East            13            82              41                41          0.500
236          2022                East            14            82              41                41          0.500
237          2022                East            15            82              41                41          0.500
238          2022                East            16            82              41                41          0.500
239          2022                East            17            82              41                41          0.500
240          2022                East            18            82              41                41          0.500
241          2022                East            19            82              41                41          0.500
242          2022                East            20            82              41                41          0.500
243          2022                East            21            82              41                41          0.500
244          2022                East            22            82              41                41          0.500
245          2022                East            23            82              41                41          0.500
246          2022                East            24            82              41                41          0.500
247          2022                East            25            82              41                41          0.500
248          2022                East            26            82              41                41          0.500
249          2022                East            27            82              41                41          0.500
250          2022                East            28            82              41                41          0.500
251          2022                East            29            82              41                41          0.500
252          2022                East            30            82              41                41          0.500
253          2022                East            31            82              41                41          0.500
254          2022                East            32            82              41                41          0.500
255          2022                East            33            82              41                41          0.500
256          2022                East            34            82              41                41          0.500
257          2022                East            35            82              41                41          0.500
258          2022                East            36            82              41                41          0.500
259          2022                East            37            82              41                41          0.500
260          2022                East            38            82              41                41          0.500
261          2022                East            39            82              41                41          0.500
262          2022                East            10            82              41                41          0.500
263          2022                East            11            82              41                41          0.500
264          2022                East            12            82              41                41          0.500
265          2022                East            13            82              41                41          0.500
266          2022                East            14            82              41                41          0.500
267          2022                East            15            82              41                41          0.500
268          2022                East            16            82              41                41          0.500
269          2022                East            17            82              41                41          0.500
270          2022                East            18            82              41                41          0.500
271          2022                East            19            82              41                41          0.500
272          2022                East            20            82              41                41          0.500
273          2022                East            21            82              41                41          0.500
274          2022                East            22            82              41                41          0.500
275          2022                East            23            82              41                41          0.500
276          2022                East            24            82              41                41          0.500
277          2022                East            25            82              41                41          0.500
278          2022                East            26            82              41                41          0.500
279          2022                East            27            82              41                41          0.500
280          2022                East            28            82              41                41          0.500
281          2022                East            29            82              41                41          0.500
282          2022                East            30            82              41                41          0.500
283          2022                East            31            82              41                41          0.500
284          2022                East            32            82              41                41          0.500
285          2022                East            33            82              41                41          0.500
286          2022                East            34            82              41                41          0.500
287          2022                East            35            82              41                41          0.500
288          2022                East            36            82              41                41          0.500
289          2022                East            37            82              41                41          0.500
290          2022                East            38            82              41                41          0.500
291          2022                East            39            82              41                41          0.500
292          2022                East            10            82              41                41          0.500
293          2022                East            11            82              41                41          0.500
294          2022                East            12            82              41                41          0.500
295          2022                East            13            82              41                41          0.500
296          2022                East            14            82              41                41          0.500
297          2022                East            15            82              41                41          0.500
298          2022                East            16            82              41                41          0.500
299          2022                East            17            82              41                41          0.500
300          2022                East            18            82              41                41          0.500
301          2022                East            19            82              41                41          0.500
302          2022                East            20            82              41                41          0.500
303          2022                East            21            82              41                41          0.500
304          2022                East            22            82              41                41          0.500
305          2022                East            23            82              41                41          0.500
306          2022                East            24            82              41                41          0.500
307          2022                East            25            82              41                41          0.500
308          2022                East            26            82              41                41          0.500
309          2022                East            27            82              41                41          0.500
310          2022                East            28            82              41                41          0.500
311          2022                East            29            82              41                41          0.500
312          2022                East            30            82              41                41          0.500
313          2022                East            31            82              41                41          0.500
314          2022                East            32            82              41                41          0.500
315          2022                East            33            82              41                41          0.500
316          2022                East            34            82              41                41          0.500
317          2022                East            35            82              41                41          0.500
318          2022                East            36            82              41                41          0.500
319          2022                East            37            82              41                41          0.500
320          2022                East            38            82              41                41          0.500
321          2022                East            39            82              41                41          0.500
322          2022                East            10            82              41                41          0.500
323          2022                East            11            82              41                41          0.500
324          2022                East            12            82              41                41          0.500
325          2022                East            13            82              41                41          0.500
326          2022                East            14            82              41                41          0.500
327          2022                East            15            82              41                41          0.500
328          2022                East            16            82              41                41          0.500
329          2022                East            17            82              41                41          0.500
330          2022                East            18            82              41                41          0.500
331          2022                East            19            82              41                41          0.500
332          2022                East            20            82              41                41          0.500
333          2022                East            21            82              41                41          0.500
334          2022                East            22            82              41                41          0.500
335          2022                East            23            82              41                41          0.500
336          2022                East            24            82              41                41          0.500
337          2022                East            25            82              41                41          0.500
338          2022                East            26            82              41                41          0.500
339          2022                East            27            82              41                41          0.500
340          2022                East            28            82              41                41          0.500
341          2022                East            29            82              41                41          0.500
342          2022                East            30            82              41                41          0.500
343          2022                East            31            82              41                41          0.500
344          2022                East            32            82              41                41          0.500
345          2022                East            33            82              41                41          0.500
346          2022                East            34            82              41                41          0.500
347          2022                East            35            82              41                41          0.500
348          2022                East            36            82              41                41          0.500
349          2022                East            37            82              41                41          0.500
350          2022                East            38            82              41                41          0.500
351          2022                East            39            82              41                41          0.500
352          2022                East            10            82              41                41          0.500
353          2022                East            11            82              41                41          0.500
354          2022                East            12            82              41                41          0.500
355          2022                East            13            82              41                41          0.500
356          2022                East            14            82              41                41          0.500
357          2022                East            15            82              41                41          0.500
358          2022                East            16            82              41                41          0.500
359          2022                East            17            82              41                41          0.500
360          2022                East            18            82              41                41          0.500
361          2022                East            19            82              41                41          0.500
362          2022                East            20            82              41                41          0.500
363          2022                East            21            82              41                41          0.500
364          2022                East            22            82              41                41          0.500
365          2022                East            23            82              41                41          0.500
366          2022                East            24            82              41                41          0.500
367          2022                East            25            82              41                41          0.500
368          2022                East            26            82              41                41          0.500
369          2022                East            27            82              41                41          0.500
370          2022                East            28            82              41                41          0.500
371          2022                East            29            82              41                41          0.500
372          2022                East            30            82              41                41          0.500
373          2022                East            31            82              41                41          0.500
374          2022                East            32            82              41                41          0.500
375          2022                East            33            82              41                41          0.500
376          2022                East            34            82              41                41          0.500
377          2022                East            35            82              41                41          0.500
378          2022                East            36            82              41                41          0.500
379          2022                East            37            82              41                41          0.500
380          2022                East            38            82              41                41          0.500
381          2022                East            39            82              41                41          0.500
382          2022                East            10            82              41                41          0.500
383          2022                East            11            82              41                41          0.500
384          2022                East            12            82              41                41          0.500
385          2022                East            13            82              41                41          0.500
386          2022                East            14            82              41                41          0.500
387          2022                East            15            82              41                41          0.500
388          2022                East            16            82              41                41          0.500
389          2022                East            17            82              41                41          0.500
390          2022                East            18            82              41                41          0.500
391          2022                East            19            82              41                41          0.500
392          2022                East            20            82              41                41          0.500
393          2022                East            21            82              41                41          0.500
394          2022                East            22            82              41                41          0.500
395          2022                East            23            82              41                41          0.500
396          2022                East            24            82              41                41          0.500
397          2022                East            25            82              41                41          0.500
398          2022                East            26            82              41                41          0.500
399          2022                East            27            82              41                41          0.500
400          2022                East            28            82              41                41          0.500
401          2022                East            29            82              41                41          0.500
402          2022                East            30            82              41                41          0.500
403          2022                East            31            82              41                41          0.500
404          2022                East            32            82              41                41          0.500
405          2022                East            33            82              41                41          0.500
406          2022                East            34            82              41                41          0.500
407          2022                East            35            82              41                41          0.500
408          2022                East            36            82              41                41          0.500
409          2022                East            37            82              41                41          0.500
410          2022                East            38            82              41                41          0.500
411          2022                East            39            82              41                41          0.500
412          2022                East            10            82              41                41          0.500
413          2022                East            11            82              41                41          0.500
414          2022                East            12            82              41                41          0.500
415          2022                East            13            82              41                41          0.500
416          2022                East            14            82              41                41          0.500
417          2022                East            15            82              41                41          0.500
418          2022                East            16            82              41                41          0.500
419          2022                East            17            82              41                41          0.500
420          2022                East            18            82              41                41          0.500
421          2022                East            19            82              41                41          0.500
422          2022                East            20            82              41                41          0.500
423          2022                East            21            82              41                41          0.500
424          2022                East            22            82              41                41          0.500
425          2022                East            23            82              41                41          0.500
426          2022                East            24            82              41                41          0.500
427          2022                East            25            82              41                41          0.500
428          2022                East            26            82              41                41          0.500
429          2022                East            27            82              41                41          0.500
430          2022                East            28            82              41                41          0.500
431          2022                East            29            82              41                41          0.500
432          2022                East            30            82              41                41          0.500
433          2022                East            31            82              41                41          0.500
434          2022                East            32            82              41                41          0.500
435          2022                East            33            82              41                41          0.500
436          2022                East            34            82              41                41          0.500
437          2022                East            35            82              41                41          0.500
438          2022                East            36            82              41                41          0.500
439          2022                East            37            82              41                41          0.500
440          2022                East            38            82              41                41          0.500
441          2022                East            39            82              41                41          0.500
442          2022                East            10            82              41                41          0.500
443          2022                East            11            82              41                41          0.500
444          2022                East            12            82              41                41          0.500
445          2022                East            13            82              41                41          0.500
446          2022                East            14            82              41                41          0.500
447          2022                East            15            82              41                41          0.500
448          2022                East            16            82              41                41          0.500
449          2022                East            17            82              41                41          0.500
450          2022                East            18            82              41                41          0.500
451          2022                East            19            82              41                41          0.500
452          2022                East            20            82              41                41          0.500
453          2022                East            21            82              41                41          0.500
454          2022                East            22            82              41                41          0.500
455          2022                East            23            82              41                41          0.500
456          2022                East            24            82              41                41          0.500
457          2022                East            25            82              41                41          0.500
458          2022                East            26            82              41                41          0.500
459          2022                East            27            82              41                41          0.500
460          2022                East            28            82              41                41          0.500
461          2022                East            29            82              41                41          0.500
462          2022                East            30            82              41                41          0.500
463          2022                East            31            82              41                41          0.500
464          2022                East            32            82              41                41          0.500
465          2022                East            33            82              41                41          0.500
466          2022                East            34            82              41                41          0.500
467          2022                East            35            82              41                41          0.500
468          2022                East            36            82              41                41          0.500
469          2022                East            37            82              41                41          0.500
470          2022                East            38            82              41                41          0.500
471          2022                East            39            82              41                41          0.500
472          2022                East            10            82              41                41          0.500
473          2022                East            11            82              41                41          0.500
474          2022                East            12            82              41                41          0.500
475          2022                East            13            82              41                41          0.500
476          2022                East            14            82              41                41          0.500
477          2022                East            15            82              41                41          0.500
478          2022                East            16            82              41                41          0.500
479          2022                East            17            82              41                41          0.500
480          2022                East            18            82              41                41          0.500
481          2022                East            19            82              41                41          0.500
482          2022                East            20            82              41                41          0.500
483          2022                East            21            82              41                41          0.500
484          2022                East            22            82              41                41          0.500
485          2022                East            23            82              41                41          0.500
486          2022                East            24            82              41                41          0.500
487          2022                East            25            82              41                41          0.500
488          2022                East            26            82              41                41          0.500
489          2022                East            27            82              41                41          0.500
490          2022                East            28            82              41                41          0.500
491          2022                East            29            82              41                41          0.500
492          2022                East            30            82              41                41          0.500
493          2022                East            31            82              41                41          0.500
494          2022                East            32            82              41                41          0.500
495          2022                East            33            82              41                41          0.500
496          2022                East            34            82              41                41          0.500
497          2022                East            35            82              41                41          0.500
498          2022                East            36            82              41                41          0.500
499          2022                East            37            82              41                41          0.500
500          2022                East            38            82              41                41          0.500
501          2022                East            39            82              41                41          0.500
502          2022                East            10            82              41                41          0.500
503          2022                East            11            82              41                41          0.500
504          2022                East            12            82              41                41          0.500
505          2022                East            13            82              41                41          0.500
506          2022                East            14            82              41                41          0.500
507          2022                East            15            82              41                41          0.500
508          2022                East            16            82              41                41          0.500
509          2022                East            17            82              41                41          0.500
510          2022                East            18            82              41                41          0.500
511          2022                East            19            82              41                41          0.500
512          2022                East            20            82              41                41          0.500
513          2022                East            21            82              41                41          0.500
514          2022                East            22            82              41                41          0.500
515          2022                East            23            82              41                41          0.500
516          2022                East            24            82              41                41          0.500
517          2022                East            25            82              41                41          0.500
518          2022                East            26            82              41                41          0.500
519          2022                East            27            82              41                41          0.500
520          2022                East            28            82              41                41          0.500
521          2022                East            29            82              41                41          0.500
522          2022                East            30            82              41                41          0.500
523          2022                East            31            82              41                41          0.500
524          2022                East            32            82              41                41          0.500
525          2022                East            33            82              41                41          0.500
526          2022                East            34            82              41                41          0.500
527          2022                East            35            82              41                41          0.500
528          2022                East            36            82              41                41          0.500
529          2022                East            37            82              41                41          0.500
530          2022                East            38            82              41                41          0.500
531          2022                East            39            82              41                41          0.500
532          2022                East            10            82              41                41          0.500
533          2022                East            11            82              41                41          0.500
534          2022                East            12            82              41                41          0.500
535          2022                East            13            82              41                41          0.500
536          2022                East            14            82              41                41          0.500
537          2022                East            15            82              41                41          0.500
538          2022                East            16            82              41                41          0.500
539          2022                East            17            82              41                41          0.500
540          2022                East            18            82              41                41          0.500
541          2022                East            19            82              41                41          0.500
542          2022                East            20            82              41                41          0.500
543          2022                East            21            82              41                41          0.500
544          2022                East            22            82              41                41          0.500
545          2022                East            23            82              41                41          0.500
546          2022                East            24            82              41                41          0.500
547          2022                East            25            82              41                41          0.500
548          2022                East            26            82              41                41          0.500
549          2022                East            27            82              41                41          0.500
550          2022                East            28            82              41                41          0.500
551          2022                East            29            82              41                41          0.500
552          2022                East            30            82              41                41          0.500
553          2022                East            31            82              41                41          0.500
554          2022                East            32            82              41                41          0.500
555          2022                East            33            82              41                41          0.500
556          2022                East            34            82              41                41          0.500
557          2022                East            35            82              41                41          0.500
558          2022                East            36            82              41                41          0.500
559          2022                East            37            82              41                41          0.500
560          2022                East            38            82              41                41          0.500
561          2022                East            39            82              41                41          0.500
562          2022                East            10            82              41                41          0.500
563          2022                East            11            82              41                41          0.500
564          2022                East            12            82              41                41          0.500
565          2022                East            13            82              41                41          0.500
566          2022                East            14            82              41                41          0.500
567          2022                East            15            82              41                41          0.500
568          2022                East            16            82              41                41          0.500
569          2022                East            17            82              41                41          0.500
570          2022                East            18            82              41                41          0.500
571          2022                East            19            82              41                41          0.500
572          2022                East            20            82              41                41          0.500
573          2022                East            21            82              41                41          0.500
574          2022                East            22            82              41                41          0.500
575          2022                East            23            82              41                41          0.500
576          2022                East            24            82              41                41          0.500
577          2022                East            25            82              41                41          0.500
578          2022                East            26            82              41                41          0.500
579          2022                East            27            82              41                41          0.500
580          2022                East            28            82              41                41          0.500
581          2022                East            29            82              41                41          0.500
582          2022                East            30            82              41                41          0.500
583          2022                East            31            82              41                41          0.500
584          2022                East            32            82              41                41          0.500
585          2022                East            33            82              41                41          0.500
586          2022                East            34            82              41                41          0.500
587          2022                East            35            82              41                41          0.500
588          2022                East            36            82              41                41          0.500
589          2022                East            37            82              41                41          0.500
590          2022                East            38            82              41                41          0.500
591          2022                East            39            82              41                41          0.500
592          2022                East            10            82              41                41          0.500
593          2022                East            11            82              41                41          0.500
594          2022                East            12            82              41                41          0.500
595          2022                East            13            82              41                41          0.500
596          2022                East            14            82              41                41          0.500
597          2022                East            15            82              41                41          0.500
598          2022                East            16            82              41                41          0.500
599          2022                East            17            82              41                41          0.500
600          2022                East            18            82              41                41          0.500
601          2022                East            19            82              41                41          0.500
602          2022                East            20            82              41                41          0.500
603          2022                East            21            82              41                41          0.500
604          2022                East            22            82              41                41          0.500
605          2022                East            23            82              41                41          0.500
606          2022                East            24            82              41                41          0.500
607          2022                East            25            82              41                41          0.500
608          2022                East            26            82              41                41          0.500
609          2022                East            27            82              41                41          0.500
610          2022                East            28            82              41                41          0.500
611          2022                East            29            82              41                41          0.500
612          2022                East            30            82              41                41          0.500
613          2022                East            31            82              41                41          0.500
614          2022                East            32            82              41                41          0.500
615          2022                East            33            82              41                41          0.500
616          2022                East            34            82              41                41          0.500
617          2022                East            35            82              41                41          0.500
618          2022                East            36            82              41                41          0.500
619          2022                East            37            82              41                41          0.500
620          2022                East            38            82              41                41          0.500
621          2022                East            39            82              41                41          0.500
622          2022                East            10            82              41                41          0.500
623          2022                East            11            82              41                41          0.500
624          2022                East            12            82              41                41          0.500
625          2022                East            13            82              41                41          0.500
626          2022                East            14            82              41                41          0.500
627          2022                East            15            82              41                41          0.500
628          2022                East            16            82              41                41          0.500
629          2022                East            17            82              41                41          0.500
630          2022                East            18            82              41                41          0.500
631          2022                East            19            82              41                41          0.500
632          2022                East            20            82              41                41          0.500
633          2022                East            21            82              41                41          0.500
634          2022                East            22            82              41                41          0.500
635          2022                East            23            82              41                41          0.500
636          2022                East            24            82              41                41          0.500
637          2022                East            25            82              41                41          0.500
638          2022                East            26            82              41                41          0.500
639          2022                East            27            82              41                41          0.500
640          2022                East            28            82              41                41          0.500
641          2022                East            29            82              41                41          0.500
642          2022                East            30            82              41                41          0.500
643          2022                East            31            82              41                41          0.500
644          2022                East            32            82              41                41          0.500
645          2022                East            33            82              41                41          0.500
646          2022                East            34            82              41                41          0.500
647          2022                East            35            82              41                41          0.500
648          2022                East            36            82              41                41          0.500
649          2022                East            37            82              41                41          0.500
650          2022                East            38            82              41                41          0.500
651          2022                East            39            82              41                41          0.500
652          2022                East            10            82              41                41          0.500
653          2022                East            11            82              41                41          0.500
654          2022                East            12            82              41                41          0.500
655          2022                East            13            82              41                41          0.500
656          2022                East            14            82              41                41          0.500
657          2022                East            15            82              41                41          0.500
658          2022                East            16            82              41                41          0.500
659          2022                East            17            82              41                41          0.500
660          2022                East            18            82              41                41          0.500
661          2022                East            19            82              41                41          0.500
662          2022                East            20            82              41                41          0.500
663          2022                East            21            82              41                41          0.500
664          2022                East            22            82              41                41          0.500
665          2022                East            23            82              41                41          0.500
666          2022                East            24            82              41                41          0.500
667          2022                East            25            82              41                41          0.500
668          2022                East            26            82              41                41          0.500
669          2022                East            27            82              41                41          0.500
670          2022                East            28            82              41                41          0.500
671          2022                East            29            82              41                41          0.500
672          2022                East            30            82              41                41          0.500
673          2022                East            31            82              41                41          0.500
674          2022                East            32            82              41                41          0.500
675          2022                East            33            82              41                41          0.500
676          2022                East            34            82              41                41          0.500
677          2022                East            35            82              41                41          0.500
678          2022                East            36            82              41                41          0.500
679          2022                East            37            82              41                41          0.500
680          2022                East            38            82              41                41          0.500
681          2022                East            39            82              41                41          0.500
682          2022                East            10            82              41                41          0.500
683          2022                East            11            82              41                41          0.500
684          2022                East            12            82              41                41          0.500
685          2022                East            13            82              41                41          0.500
686          2022                East            14            82              41                41          0.500
687          2022                East            15            82              41                41          0.500
688          2022                East            16            82              41                41          0.500
689          2022                East            17            82              41                41          0.500
690          2022                East            18            82              41                41          0.500
691          2022                East            19            82              41                41          0.500
692          2022                East            20            82              41                41          0.500
693          2022                East            21            82              41                41          0.500
694          2022                East            22            82              41                41          0.500
695          2022                East            23            82              41                41          0.500
696          2022                East            24            82              41                41          0.500
697          2022                East            25            82              41                41          0.500
698          2022                East            26            82              41                41          0.500
699          2022                East            27            82              41                41          0.500
700          2022                East            28            82              41                41          0.500
701          2022                East            29            82              41                41          0.500
702          2022                East            30            82              41                41          0.500
703          2022                East            31            82              41                41          0.500
704          2022                East            32            82              41                41          0.500
705          2022                East            33            82              41                41          0.500
706          2022                East            34            82              41                41          0.500
707          2022                East            35            82              41                41          0.500
708          2022                East            36            82              41                41          0.500
709          2022                East            37            82              41                41          0.500
710          2022                East            38            82              41                41          0.500
711          2022                East            39            82              41                41          0.500
712          2022                East            10            82              41                41          0.500
713          2022                East            11            82              41                41          0.500
714          2022                East            12            82              41                41          0.500
715          2022                East            13            82              41                41          0.500
716          2022                East            14            82              41                41          0.500
717          2022                East            15            82              41                41          0.500
718          2022                East            16            82              41                41          0.500
719          2022                East            17            82              41                41          0.500
720          2022                East            18            82              41                41          0.500
721          2022                East            19            82              41                41          0.500
722          2022                East            20            82              41                41          0.500
723          2022                East            21            82              41                41          0.500
724          2022                East            22            82              41                41          0.500
725          2022                East            23            82              41                41          0.500
726          2022                East            24            82              41                41          0.500
727          2022                East            25            82              41                41          0.500
728          2022                East            26            82              41                41          0.500
729          2022                East            27            82              41                41          0.500
730          2022                East            28            82              41                41          0.500
731          2022                East            29            82              41                41          0.500
732          2022                East            30            82              41                41          0.500
733          2022                East            31            82              41                41          0.500
734          2022                East            32            82              41                41          0.500
735          2022                East            33            82              41                41          0.500
736          2022                East            34            82              41                41          0.500
737          2022                East            35            82              41                41          0.500
738          2022                East            36            82              41                41          0.500
739          2022                East            37            82              41                41          0.500
740          2022                East            38            82              41                41          0.500
741          2022                East            39            82              41                
```

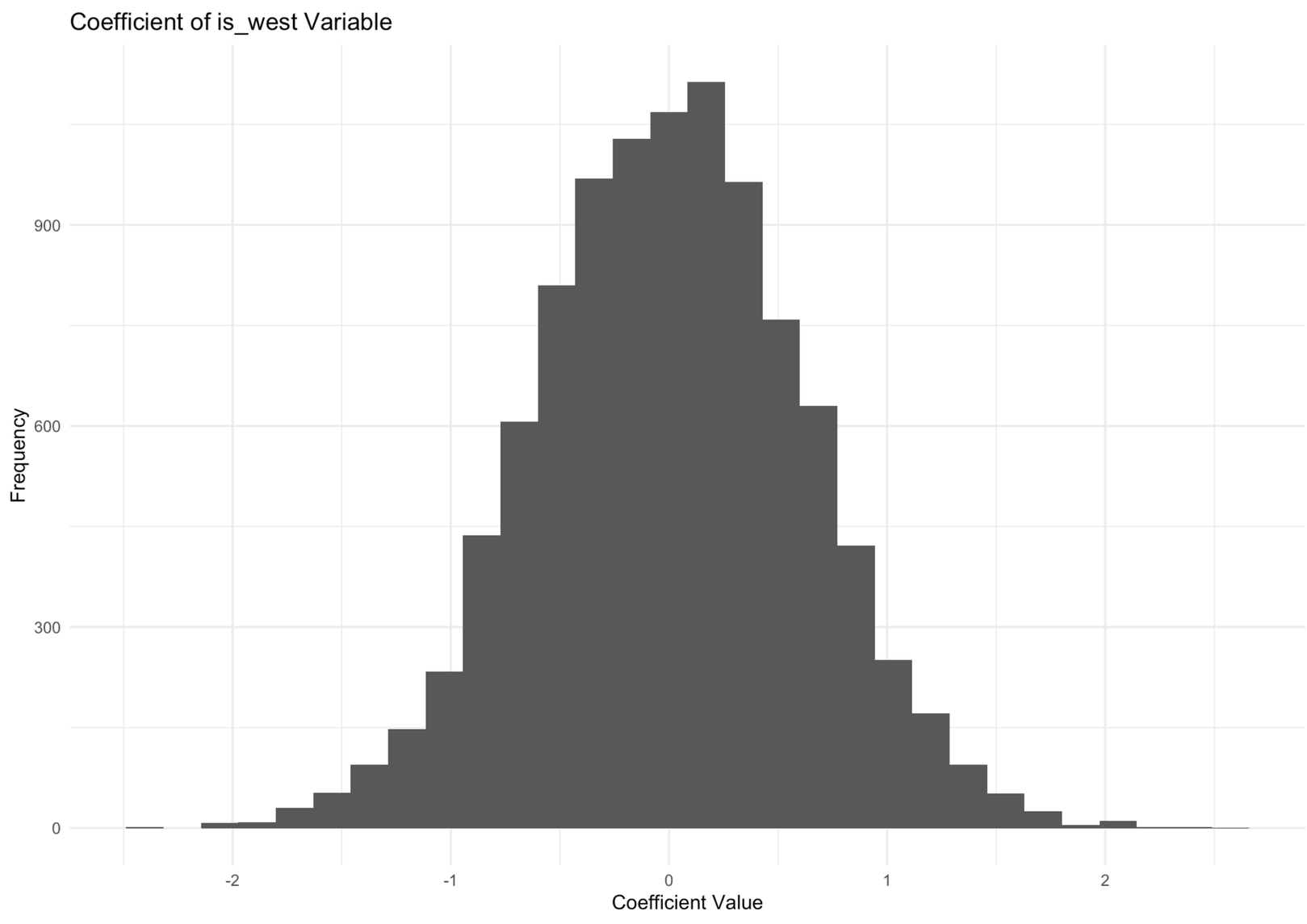
```
  model4 <- glm(playoffs_num ~ win_pct + random_is_west, data = standings, family = binomial(link = logit))
  summary(model4)
  # extract the cofficient of is_west
  coef_random_is_west <- append(coef_random_is_west, model4$coefficients[3])
}
df_random_is_west <- data.frame(coef_random_is_west)
```

PART (a): Make a ggplot comparing these 10,000 randomized `is_west` coefficients to the `is_west` coefficient you observed in question 13.

ANSWER 14 (a):

```
ggplot(df_random_is_west, aes(x=coef_random_is_west)) +
  geom_histogram() +
  labs(title="Coefficient of is_west Variable",
            x="Coefficient Value",
            y="Frequency") +
  theme_minimal()
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



PART (b): What do you conclude from your plot? Please answer in no more than 3 sentences.

ANSWER 14 (b): The value of the coefficient of the is_west variable appears to follow a normal distribution with a mean around zero. This means that in the conditions of randomly reordering the conference label and running numbers of iterations, whether a team is in the West conference or not nearly has no impact on whether the team can make the playoffs.

Short Answer (Modeling)

Question 15

Two rookies come into the league and each play the same number of minutes. Rookie A shot 37/100 from 3 and rookie B shot 20/50 from 3. The general manager asks you which player you expect to be a better three point shooter long term. You have a week to work on this hypothetical project.

PART (a): What kind of data and information would you collect in order to answer this? Describe the features you'd use and the model you'd build to answer the question. You don't need to actually do the work here, just describe your process. Please limit your response to no more than 5 sentences.

ANSWER 15 (a): The data I would collect include 1) the shooting location for the made and missed three-pointers, which helps us know if the player relies more on the corner threes or equally distributes his shots, 2) how many of the shots made were in a tight game time, e.g., the point difference with the opponent is within five or less points, 3) the assisted three-pointer field goals percentage, which tells if the player is able to create his own shot, and 4) if the made shot is done in wide-open or being contested. I would consider applying a multiple linear regression model with at least all of the above four factors included as predictors. The response variable for my model could be either the number of wins in a season or the average point the team could score in a game. That is because I always believe that on evaluating a player's value, whether he's a shooter or not, we shall always consider how can he help the team win.

PART (b): If you had to choose today without doing any further research, would you pick player A or player B? Why? Please limit your response to no more than 2 sentences.

ANSWER 15 (b): Player A will be my choice, as the data appears to tell me he is more capable to create his own shot, considering there's not much difference in the field goal percentage. However, if I could, I would strongly suggest not to evaluate a player simply based on a point of the data.

Question 16

QUESTION: You are studying offensive rebounding as part of your job as Data Analyst with an NBA team. You are trying to create a model that will help predict when there will be an offensive rebound.

Your first model is a GBM (gradient boosted machine) that includes the location data (at the time the ball hits the rim) and height for all 10 players on the floor. It outputs a prediction for the percentage chance each player will collect the rebound.

Your second model is a logistic regression model that includes the shot distance, the number of players who crash the boards, and the distance to the rim for the closest two offensive and defensive players. This model outputs a prediction for the percentage chance the offensive team secures the rebound.

In no more than 4 sentences, how would you decide which model to move forward with? Why?

ANSWER 16: I might go with GBM as the response variable it delivers, the percentage of each player will collect the rebound, is considered more flexible for coaches to plan the team's second chance offense or transition defense. Coaches can base on each player's percentage of getting the rebound and his shooting range/defensive ability to best decide who shall go for the offensive rebound and who shall prepare for the defense. However, I would prefer trying more predictors, e.g., the player's speed or how high/quick a player can jump, for both models before making my final call if I am really given the responsibility.

Question 17

QUESTION: Your coach hears about the project and is interested in the tradeoffs between offensive rebounding and transition defense. He asks you to expand the research you have been doing into a study to help him determine when/how many players he should send to crash the offensive boards.

How would you use one of the models described above to answer the question for the coach? (Please select one of the two models to write about for this portion of the question.) What other research would be necessary to effectively answer this question for the coach? Describe, in general terms, your plan to answer the coach's question and what you would plan to present to him. Please answer this question in no more than 6 sentences.

ANSWER 17: In addition to the GBM model mentioned above, I would also build two models for predicting the scores we could have in the following second chance offense and the scores we might allow in the following transition defense. These two models might be hierarchical models with each of the 29 teams in the league as the group variable. I would present to the coach with the net scores we could possibly have in this position, which is the points gained in the second chance offense minus the points allow in the potential transition defense. I would suggest the coach to go with the strategy that results in the highest net scores for the team. The details of my strategy shall include which kinds of players, e.g., based on their positions, shall go for the offensive rebound, who shall stand by at the three-point line, and who shall prepare for the transition defense.