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*Homework 8*

1.

- f - Based on the output, the probability of Kansas reaching the Elite Eight is 49.74%, while Florida has a 9.71% chance.
- h - Michigan appeared in the championship 554 times, while Villanova appeared 3214 times.
- i - Yes, they are consistent with each other with the same amount of times, Michigan = 554 and Villanova = 3214.

2.

- c - The lowest overachiever is the Minnesota Timberwolves and the biggest underachiever is the New Orleans Pelicans.
- d - Based on the plot, there is no homoscedasticity with points. Also, the points show a difference and are scattered uncorrelated with each other. This means there is no relationship.
- e - The data was accurate to a certain point but then begins not showing accurate data after a point. Besides this, the teams that did show up were quite well in showing the win totals overall with close data in two rows of the simulated wins to actual wins.

- d - The six division winners that the simulation got correct were Toronto Raptors (Atlantic), Cleveland Cavaliers (Central), Miami Heat (Southeast), Golden State Warriors (Pacific), San Antonio Spurs (Southwest), and Oklahoma City Thunder (Northwest). The teams that were underestimated are Boston Celtics (Atlantic), Indiana Pacers (Central), Atlanta Hawks (Southeast), LA Clippers (Pacific), Dallas Mavericks (Southwest), and Portland Trail Blazers (Northeast).

3.

- c - These histograms seem to be very similar to each other with almost identical distribution overall with the simulated wins. So, these histograms show a similar normality and skewness but the skewness in lecture slides seems to be a bit more obvious compared to the results for in 3b. Based on the fixed number of games and the higher tie probability of points, it could contribute to an evenly distribution and smoothness. The fixed number of games shows a consistent range of possible outcomes, and the higher tie probability contributes to a more even distribution of points, reducing the skewness in the histograms.
- d - Manchester City's simulated point of data was 0. They often finished at the top of the Premier League for 77.9104 of the time. Additionally, the number of times they achieved a point total of at least 100 was 0.5256 on average. Regarding these results, Manchester City was one of the stronger and was a very good team in the simulation.

- e - These results show that the win probability for Southampton at 0.48, Burnley at 0.52, and a draw is 0.48.

- Southampton win probability:

$$\text{Regression} = 1396.192 + (1500 - 1396.192/2) = 1448.096$$

$$\text{Win} = 1 / 1 + 10^{((1460.71 - 1448.096)/400)} = 0.48$$

- Burnley win probability:

$$\text{Regression} = 1421.419 + (1500 - 1421.419/2) = 1460.71$$

$$\text{Win} = 1 / 1 + 10^{((1448.096 - 1460.71)/400)} = 0.52$$

- Draw =  $1 / 1 + 10^{((1460.71 - 1448.096)/400)} = 0.48$

- f -

$$\text{Southampton} = 1448.096 + 19.9(0.5 - 0.48) = 1448.484$$

$$\text{Burnley} = 1460.71 + 19.9(0.5 - 0.52) = 1460.312$$