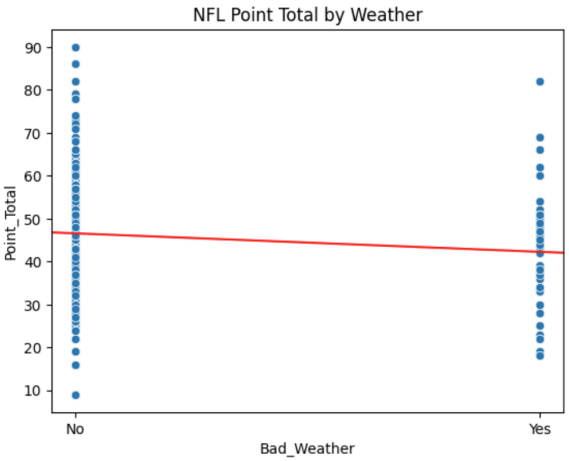
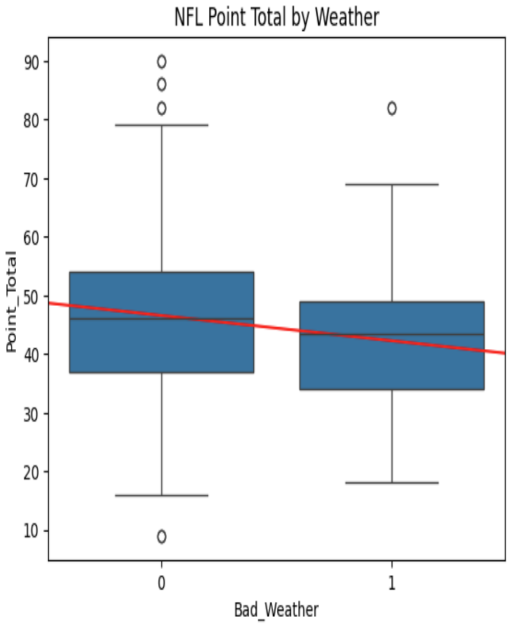
NFL Scoring Based on Weather

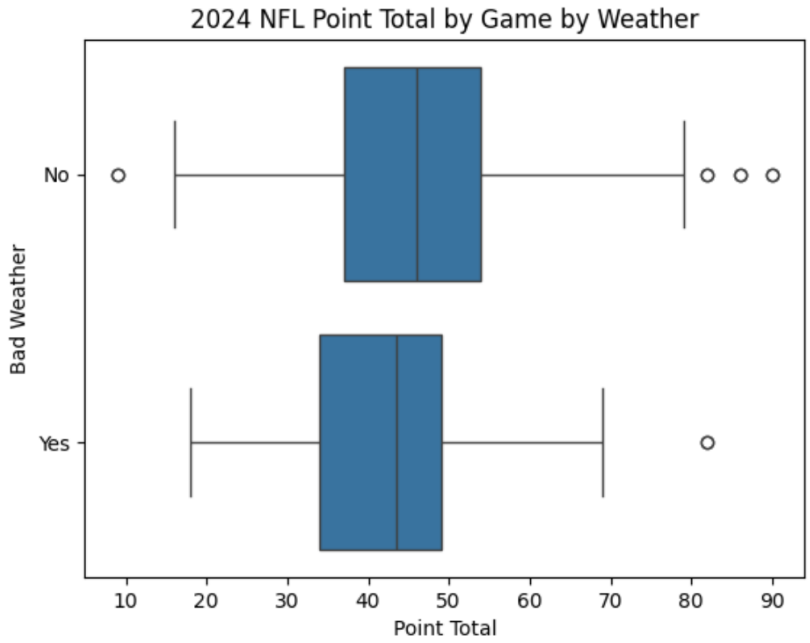
The NFL is a constant changing league, to make the game more entertaining for both the players and the fans. As the NFL is a business, the entertainment value of the game is important to them. Typically, people view games more entertaining when there are more points scored. While the NFL is constantly updating and implementing new rules in favor of the offenses, leading to more points scored, one thing the NFL can not control is the weather and how it affects the game. We will be investigating to see if having bad weather has any affect on the points scored during NFL games. We will be testing the null hypothesis, which is, bad weather does not affect the amount of points scored in an NFL game.

In order to gain a better understanding of this question we first have to look at data from NFL games, gather the points scored from each week and each team, and determine if it was a bad weather game or not. After that we will separate the bad weather games from the normal weather games and see how the point totals per game. In order to do this, I started by going to oddsshark.com, which provides each NFL team's historical gamelog by season.I chose the most recent full NFL season, so I did the 2024 season gamelogs. The gamelog provides a date column, opponent column, result column, score column, and some columns about the over/under point predictions for the game. I then had to copy all 17 weeks for all 32 NFL teams individually into an excel file. From there, I was most concentrated on the Date column, opponent column, and points column. However the points column was not complete, as it had the data saved in a *team1score-team2score* format. I needed to split this into two separate columns so that way I could add the points together to get the total points scored for each game. I split the column up by converting text to columns and choosing delimited file type and splitting by "-". Now with the point total separated by points for both teams that faced, I was able to finally add a column with the total points for the game, using a sum function. Now we have the point totals for every single game for every single team throughout the 2024 NFL season. Next, we had to determine the weather for those games. I did this by merging data from NFLWeather.com which provides historical data with what the weather was for each game. The data that I used from that website was the team column, Temperature, Weather (Cloudy, Rains, Etc), and the wind. However, that website is filtered by each Week, so when I added the data into excel, I filtered by week and then added the data for each week one by one. Now that we had the three important weather conditions for each game, it was time to determine if they were bad weather games. According to profootballtonight.com, bad weather games occur when there is cold weather, high winds, or precipitation. So next, I added a bad weather column that determined the weather for each game of every week, where it would be classified as a bad weather game if one of the following occurred; temperature was below 40 degrees fahrenheit, winds were 15 miles per hour or greater, or if there was any kind of precipitation. I achieved this by using a nested IF statement on excel. From there, I downloaded that excel file as a CSV and uploaded it into python. From there I was able to create data visualizations and find the

important summary statistics for the models.







Analyzing the models and the GLM statistics, it is determined that the typical NFL game with normal weather has an average of just over 46 and a half points. We can then see that beta 1 is -4.3140 meaning that when bad weather games occur, the average points scored during those bad weather games is 4.3 points lower than normal weather games. The pvalue is .004 which is well under the .05 threshold, signaling that the beta is statistically significant meaning reject the null hypothesis. Some limitations involved in this are the amount each team spent on offensive players. Not all offenses are equal in terms of money spent, as some teams elect to use more of their salary cap than others do, which would lead to those teams having better offenses, scoring more points.

Through the research and data gathered, I created statistical models and summaries of the models to come to a conclusion about whether bad weather has an impact on points scored in NFL games. My analysis found that on average, in a bad weather game you will see 4.3 less points than you would in a normal weather game. This tells us the there is a direct correlation, and it allows us to reject the null hypothesis that bad weather has no impact on points scored in NFL games.

References:

NFLWeather
Seattle Seahawks - NFL Schedule & Results for 2024 | Odds Shark
How NFL Teams Strategize for Different Weather Conditions - Pro Football Tonight
AI: I used gemini AI to help assist in writing code in python