|  |  |
| --- | --- |
| **Season** | **Touchdown****Passes** |
| 1 | 28 |
| 2 | 30 |
| 3 | 28 |
| 4 | 45 |
| 5 | 39 |
| 6 | *Injured* |
| 7 | 38 |
| 8 | 31 |

**The Case of Aaron Rogers** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Aaron Rogers has been the Green Bay Packers’ starting quarterback for nearly a decade. It’s time to see how he’s done. The table to the right shows how many touchdown passes he has thrown each season over the course of 8 seasons.

**Section 1: The Basics**

1. First, how good looking is Aaron Rogers on a scale of 1 – 10? Feel free to elaborate in as much detail as you like. Remember that this counts for a grade. You may ask for additional paper.

1. Second, describe any trends you see in the data. Is he improving over time? Is he getting worse over time? Cite specific data points to justify your claim.
2. What are the independent and dependent variables in this scenario?
3. Explain what restrictions should there be on the domain and range of this situation. Why?

**Section 2: Getting Dirty**

His touchdown passes over time is closely modeled by the function $y=-x^{2}+9x+22$, where x represents the season and y represents the number of touchdown he completed that year. Let’s see how this function backs up your preliminary analysis. **Answer the questions in this section based on this equation, not on the table. Show all work.**

1. How many touchdown passes does the model predict Aaron Rogers threw in his second season?
2. How many touchdown passes does the model predict he’ll throw in his best season? What season is that?
3. What’s the lowest number of touchdowns a quarterback could possibly throw in a season? When does the model predict this could happen for Aaron Rogers?
4. Using your answers in this section, graph the key features of the equation on the graph provided. *Remember to label your scale and axes*.

**Section 3: Getting Real**

1. How well do your answers for questions 5 and 6 align with the real data in the table? What does this suggest about the model?
2. If you got real fancy, you’d find the line of best fit for the data in the table is really $y=-0.83x^{2}+8.5x+17.6$. Using your calculator, graph this equation and find its vertex and x-intercepts.

vertex: x-intercepts:

1. How close were your answers for questions 5 and 6 to the proper model?
2. Which model is closer to the real data in the table? Why might that be?

**Section 3: Getting Clever**

By this point you have lots of data. Let’s use it.

1. Let’s say you’re a recruiter for the Denver Broncos and you’re looking for a quarterback. If you were considering Aaron Rogers, would you offer to pay him more, less, or the same salary compared to what he earns now? Use the data and model to justify your answer.
2. How confident are you about the predictions this model is making? If you’re not sure how confident you are, what additional information would you like to see about the model?
3. If Aaron Rogers ended up throwing 40 touchdown passes in the next season, what would it say about the model? Would it increase your confidence, decrease your confidence, or make no change to your confidence? Why?