

Quadratic Regression Analysis

Name: _____ Date: _____

1. A pumpkin tossing contest is underway. A catapult launches pumpkins from a height of 25 feet above the ground at a speed of 125 feet/s. The table below shows the distances (in feet) the pumpkin travels when launched at different angles. Graph the data and use a quadratic fit to model this data. Be sure to include the equation and also the r^2 value.

Angle	20	30	40	50	60	70
Distance	372	462	509	501	437	323

- How reliable is the curve of best fit?
 - Use the equation to calculate/estimate the distance (in feet) a pumpkin would travel if fired at an angle of i) 35 degrees and ii) 80 degrees. State whether each calculation is an interpolation or extrapolation.
 - Use the equation to calculate the angle required to launch a pumpkin a distance of 350 feet. You will need to use the quadratic equation for this.
2. A study compared the speed, x , in miles per hour and the average fuel economy y (in miles per gallon) for cars. The results are shown in the table. Graph the data and use a quadratic fit to model this data. Be sure to include the equation and also the r^2 value.

Speed, x	15	20	25	30	35	40	45	50	55	60	65	70
Fuel Economy, y	22.3	25.5	27.5	29	28.8	30	29.9	30.2	30.4	28.8	27.4	25.3

- How reliable is the curve of best fit?
- Calculate the fuel economy when the speed is 80 mi/h.
- Calculate the fuel economy when the speed is 42 mi/h.
- Calculate the speed when the fuel economy is 23 mi/gallon.
- Calculate the speed that maximizes the fuel economy.

3. The following table shows how the wind affects a runner's performance in the 200m. Positive wind speeds correspond to tailwinds and negative winds correspond to headwinds. Positive changes in finishing time mean worsened performance (your time is slower) and negative changes mean improved performance (your time got faster). Graph the data and use a quadratic fit to model this data. Be sure to include the equation and also the r^2 value.

Wind Speed (m/s), s	-6	-4	-2	0	2	4	6
Change in finishing time, t	2.28	1.42	0.67	0	-0.57	-1.05	-1.42

- How reliable is the curve of best fit?
- Does the graph have a maximum or minimum vertex? What does this represent?
- What is the wind speed if there is to be no change in the finishing time?
- Predict the change in the finishing time when the wind speed is -1. Also calculate/predict the finishing time when the wind speed is 5 m/s.