2.6 Competing Function Model Validation

AP Precalculus Name: _____ **CA #1**

1. The owners of a local taco stand are trying to increase revenue and decide to invest a portion of their profits to advertising. The table below shows the amount spent on advertising compared to the revenue brought in for various months of the year.

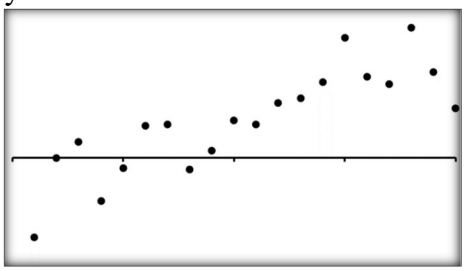
Money spent on advertising a	\$500	\$300	\$700	\$500	\$0	\$200
Revenue R	\$7,000	\$4,000	\$7,500	\$6,000	\$3,000	\$4,500

   a. Find a linear regression curve. Round to three decimal places.

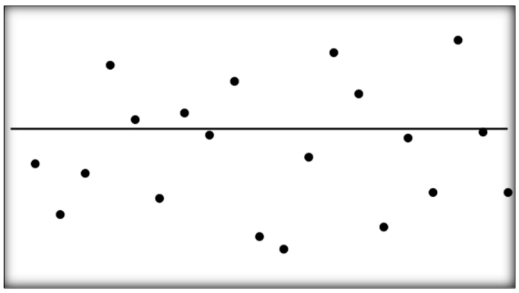
   b. Use your model from part a to find the error at $a = 200$.

   c. Is the value predicted an overestimate or underestimate of the actual value?

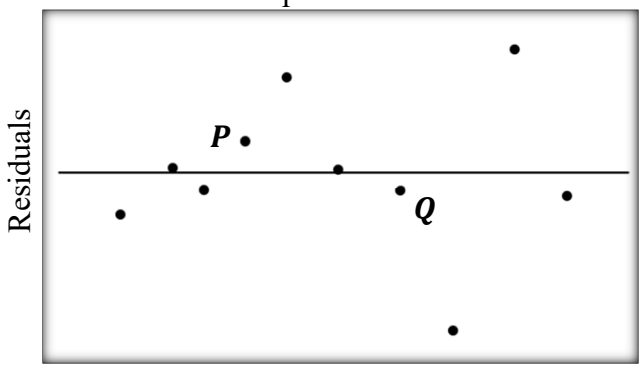
2. A student creates a model for a data set. The residual plot for their linear regression is shown. Is the model appropriate? Why or why not?



3. A student creates a model for a data set. The residual plot for their exponential regression is shown. Is the model appropriate? Why or why not?



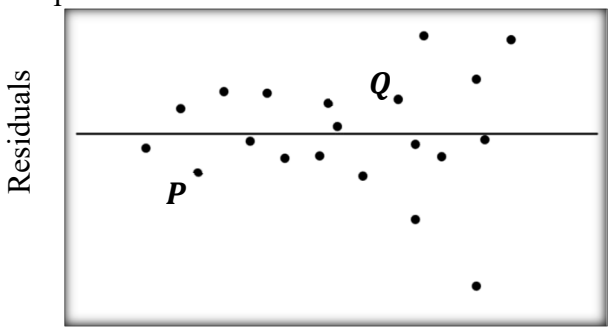
4. A doctor's office has collected data regarding patients' age and their cholesterol level. A regression model was calculated with the age as input values and the cholesterol level as the output values. The residual plot for the regression model and data points is below.



a. The given residual plot has a point labeled P at the coordinate $(43, 8.73)$. What does point P indicate in the context?

b. The point labeled Q is at the coordinate $(58, -5.02)$. What does point Q indicate in the context?

5. Teen birthrates (the number of births per 1000 females aged 15 to 17 years-old) are being compared to poverty levels (which is the percent of the state's population living in households with incomes below the federally defined poverty level). A regression model was calculated for several states with teen birthrate as input values and the poverty level (as a percent) as the output values. The residual plot for the regression model and data points is below.



a. The given residual plot has a point labeled P at the coordinate $(14, -2.08)$. What does point P indicate in the context?

b. The point labeled Q is at the coordinate $(37, 1.87)$. What does point Q indicate in the context?

Answers to 2.6 CA #1

1a. $R(a) = 6.755a + 2856.383$	1b. $4207.383 - 4500 = -292.617$	1c. Underestimate
2. No, the residual plot creates a pattern	3. Yes. No clear pattern.	
4a. Because point P is above the x-axis, for the patient with an age of 43, the model underestimates the actual cholesterol level by 8.73.	4b. Because point P is below the x-axis, for the patient with an age of 58, the model overestimates the actual cholesterol level by 5.02.	
5a. Because point P is below the x-axis, for the state with a teen birthrate of 14 per 1000 females aged 15 to 17 years-old, the model overestimates the poverty level by 2.08 percent.	5b. Because point Q is above the x-axis, for the state with a teen birthrate of 37 per 1000 females aged 15 to 17 years-old, the model underestimates the poverty level by 1.87 percent.	