Assignment

LESSON 4: Modeling Behavior

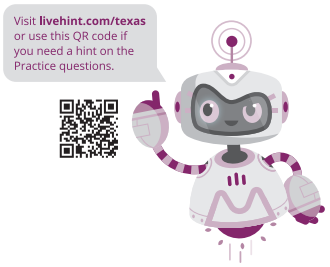
Write

Explain how can you determine if a set of data is best represented by a quadratic regression equation.

Remember

Quadratic regression equations can be used to model real-world situations.

Practice



1. The table shows the percent of public schools with internet access from 1994 to 2005. (The largest growth years are shown in the table.)
   a. Predict whether a linear or quadratic regression equation will best fit the data. Explain your reasoning.
   b. Create a scatter plot of the data.
   c. Does your scatter plot change or support your answer to part (a)? Explain your reasoning.
   d. Andrew thinks a quadratic regression equation would best fit the data. Calculate the quadratic regression equation of the data. Do you agree with Andrew? Explain your reasoning.
   e. The year 2004 is missing from the data. Calculate the percent of public schools with internet access in 2004. Does your answer make sense in terms of the problem situation? Explain your reasoning.
   f. Calculate the percent of public schools with internet access in 2020. Does your answer make sense in terms of the problem situation? Explain your reasoning.
   g. What are the x-intercepts and what do they mean in terms of the problem situation?
   h. In what year does the percent of public schools with internet access begin to decline? Explain how you determined your answer.
   i. Do you think it is likely that the percent of public schools with internet access will decline? Explain your reasoning.

Year	Percent of Public Schools with Internet Access
1994	35
1995	50
1996	65
1997	78
1998	89
1999	95
2000	98
2001	99
2002	99
2003	100
2005	100

2. The number of catfish in Lake Paul is growing in a way that can be represented by the quadratic function $c(x) = 2x^2 + 50$, where x represents the number of months since the initial number of catfish was counted.
   a. Determine any restrictions on the domain of $c(x)$ based on the problem situation. Explain your reasoning.
   b. Graph $c(x)$ with the restricted domain based on the problem situation. Be sure to label your graph.
   c. What is the domain and range of the inverse of $c(x)$ with the restricted domain?
   d. Graph the inverse of $c(x)$ with the restricted domain. Be sure to label your graph.
   e. Explain why the inverse of $c(x)$ with the restricted domain is a function. Then, write an equation for its inverse.
   f. If there are 178 catfish in the lake, how many months have gone by since the initial number of catfish was counted? Explain your reasoning.
   g. Five months have gone by since the initial counting of the catfish. How many catfish are in Lake Paul now? Explain your reasoning.

Stretch

1. The base of a triangle is represented as $6x$. The height of a triangle is represented as $4x$.
   a. What is the equation for the inverse of the area of the triangle? Explain your reasoning.
   b. If the area of the triangle is 108 meters, what is the value of the inverse of the function? Explain your reasoning.

Review

1. Consider each function shown.
   a. Graph each function on the same coordinate plane.
   b. Describe how functions w and z have been transformed from function t.

$t(x) = (x - 3)^2$
$w(x) = 3(x - 3)^2$
$z(x) = 3(x - 3)^2 + 1$

2. Consider the function $f(x) = x^2 - 2x - 2$.
   a. Graph the function.
   b. Describe the key characteristics of the graph.
3. The cost of producing chapter books for a company is $C(x) = 6x + 81$. The company's revenue for every chapter book sold is $R(x) = 36x - x^2$.
   a. What is the company's break-even point for the production and sales of chapter books?
   b. What does the solution mean?
   c. Show the solution graphically.