

Assignment

Write

Describe the information that can be used to determine whether a linear or exponential function is best to model a context and data.

Remember

You can use exponential functions to model scenarios that involve a percent increase or decrease, such as compound interest and population growth or decay.

Sometimes it may be difficult to determine whether a scatter plot is best modeled by a linear or exponential function. In these cases, sometimes knowing the scenario can help, while in other cases more data points or information may be needed.

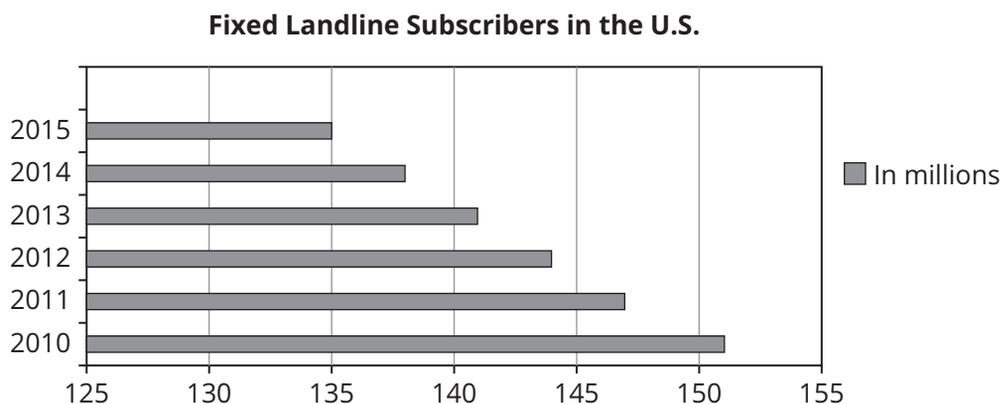
Practice

1. The table shows the number of U.S. Post Offices at the beginning of each decade from 1900 to 2000.
 - a. Create a scatter plot of the data.
 - b. Determine the exponential regression equation and the value of the correlation coefficient, r . Then graph the equation on the grid with the scatter plot.
 - c. Predict the number of U.S. Post Offices in the year 2050.
 - d. Predict when the number of U.S. Post Offices will reach 20,000.
 - e. What do you think is causing the decline in the number of U.S. Post Offices?

Year	Number of U.S. Post Offices
1900	76,688
1910	59,580
1920	52,641
1930	49,063
1940	44,024
1950	41,464
1960	35,238
1970	32,002
1980	30,326
1990	28,959
2000	27,876

Stretch

1. The number of fixed landline phone subscribers in the U.S. has been declining. The bar graph shows the decrease in the number of subscribers from 2010 to 2015.



- a. To estimate the number of subscribers per year, create a scatter plot of the ordered pairs, with x representing the number of years since 2010 and y representing the number of subscribers in millions.
- b. Determine both an exponential and a linear regression function to model the situation.
- c. Which model would you use from part (b)? Explain your reasoning.

Review

1. Given $f(x) = 2^x$, graph $g(x) = -f(x - 1) + 2$.
2. Given $a(x) = \frac{1}{2}^x$, graph $b(x) = a(-x) - 1$.
3. An experiment begins with 400 bacteria. The bacteria population doubles each day. Write an equation in function notation to represent the number of bacteria as a function of the day number, x . Explain how you determined the equation.
4. Graph and solve each system of linear inequalities.
 - a.
$$\begin{cases} y < -x - 2 \\ y < x + 1 \end{cases}$$
 - b.
$$\begin{cases} y > -\frac{1}{2}x + 2 \\ y < \frac{1}{3}x - 1 \end{cases}$$