Math 1 Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4-5 Exponential Regression Practice** Date\_\_\_\_\_\_\_\_

* *I can identify linear and exponential situations and distinguish between the two.*
* *I can construct a linear or exponential function from an arithmetic sequence, table of values or verbal description.*

Your family is planning on moving across the country to the city of Smithville. The tables on this sheet show some historical statistics about Smithville that were gathered through online resources. Your parents are wondering if it is possible to use this data to make some predictions about the future of Smithville.

|  |  |
| --- | --- |
| **Year** | **Median Price of a New House** |
| 1990 | $112,000 |
| 1992 | $124,500 |
| 1994 | $150,000 |
| 1996 | $174,000 |
| 1998 | $199,500 |
| 1999 | $214,000 |
| 2000 | $222,000 |
| 2002 | $248,000 |
| 2005 | $285,000 |

1. On your calculator, make a scatterplot of the *(year, median price of a new home)* data. When looking at the year data, just type in the number of years **after 1990**. Example: 1992 = 2.

a. What type of model would fit this data better: linear or exponential? Explain your answer.

b. Find the equation of thelinear regression line for this data. Write the equation below. Also, find the correlation coefficient and list it below. Pay attention to your rounding.

*r* = \_\_\_\_\_\_\_\_\_ *f*(*x*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(nearest thousandth) (nearest whole number)

c. Now find the exponential regression for the data. Write the equation below.

*f*(*x*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(nearest thousandth)

d. Graph the equations from 2a and 2b along with your scatterplot from Number 1. Which regression line fits your data better?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Population** |  | **Year** | **Crimes** |
| 1990 | 100,000 |  | 1990 | 13996 |
| 1992 | 132,000 |  | 1992 | 9641 |
| 1994 | 174,000 |  | 1994 | 6587 |
| 1996 | 232,000 |  | 1996 | 4575 |
| 1998 | 305,000 |  | 1998 | 3100 |
| 1999 | 351,000 |  | 1999 | 2745 |
| 2000 | 405,000 |  | 2000 | 2255 |
| 2002 | 535,000 |  | 2002 | 1515 |
| 2005 | 813,000 |  | 2005 | 854 |

2. Now make a scatterplot of the *(year, population)* data.

a. Decide which type of regression would be best to model this data set and write its equation below using function notation. Round to the nearest hundredth.

b. Explain what the numbers in your equation mean in the context of this data set.

c. Use your regression equation to predict the population for 2015.

d. In what year will the population reach 2 million?

3. Make one last scatterplot for the *(year, crimes)* data.

1. Determine which type of regression will best model this data set. Write the explicit equation below. Round to the nearest hundredth.
2. Explain what the numbers in your equation mean in the context of this data set.
3. What is the half life for the number of crimes?
4. Predict how many crimes there will be in 2023.