MODELING UTAH POPULATION DATA

Math 1010 Intermediate Algebra Project

According to data from the U.S. Census Bureau, Population Division, the population of Utah appears to have increased linearly over the years from 1980 to 2008. The following table shows the population in 100,000's living in Utah according to year. In this project, you will use the data in the table to find a linear function f(x) that represents the data, reflecting the change in population in Utah.

Estimates of Utah Resident Population, in 100,000's

Year	1980	1988	1993	2000	2004	2009				
x	0	8	13	20	24	29				
Population, y	14.6	16.9	19	22.4	24.4	27.8				

Source: U.S. Census Bureau, Population Division

 Using the graph paper on the last page, plot the data given in the table as ordered pairs.

Label the x and y axes with words to indicate what the variables represent.

- 2. Use a straight edge to draw on your graph what appears to be the line that "best fits" the data you plotted. You will only have one line drawn, rather than several pieces of lines
- 3. Estimate the coordinates of two points that fall on your best-fitting line. Write these points below.

Use the points that you wrote down to find a linear function f(x) for the line. Show your work!

find slope
$$M = \frac{24-16}{22-5}$$
 $M = \frac{8}{17} = 0.47$ $y = \frac{8}{17}x+6$

$$f(x) = \frac{8}{17} \times + 13.64$$

4. What is the slope of your line? $\mathbf{m} = \frac{\mathbf{N}}{17} = \frac{\mathbf{N}}{17} = \frac{\mathbf{N}}{17}$ Interpret its meaning. Does it make sense in the context of this situation? Please

use complete sentences to respond to these questions.

The positive slope indicates a slope that risks as it travels along the X-axis, which represents years. As this model shows an increase in population, the slope would be positive. The numerator means the y-intercept would move up 8 points, indicating 800,000 people, from the original point (5,16) of 5 years passed with 1.6 million people. The denominator means the X-Intercept should move to the right 17 years. This matches the line I started with on my graph.

5. Find the value of f (45) using your function from part 3. Show your work, then write your result in the blank below.

$$\begin{array}{c}
0.47 \\
\times 45 \\
188 \\
21.15 \\
21.15
\end{array}$$

$$f(45) = 34.79$$

Write a sentence interpreting the meaning of f(45) in the context of this project.

In "f(x)" the x represents the number of years that have passed since 1980- Bry replacing x with 45, we can know what the population might be in 2025. When we solve the equation, the result is 34.79. Since they axis represents the population in 100,000 years, we must multiply 34.79 by 100,000. se your function from part 3 to approximate in what year the residential. The result is

6. Use your function from part 3 to approximate in what year the residential population of Utah reached 2,000,000. Show your work.

$$20.00 = 0.47 \times + 13.64$$

 13.64
 $6.36 = 0.47 \times$
 0.47
 0.47
 0.47
 0.47
 0.47
 0.47
 0.47
 0.47

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3,479,000 people.

7.	Compare your	linear fun	ection with	that of	another	student o	r group.
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Comparison function: $f(x) = 0.39 \times + 14.6$

Is the comparison function the same as the function you wrote down for part 3?

NO

If they are different, explain why.

We must have drawn our lines a little differently, which would have caused us to choose different points on those lines. The functions are similar, however.

If they are the same, explain why.

NA

8. In actuality, using a linear growth model for population is not common. Most models are exponential models, due to the fact that most populations experience relative growth, i.e. 2% growth per year. Linear models for nonlinear relationships like population work only within a small time frame valid close to the time of the data modeled. Discuss some of the false conclusions you might reach if you use your linear model for times far from 1980-2008.

From this model, I would assume the population growth was very steady and that it would continue to increase by the same number each year.

POPULATION (IN 100,000'S) : Y- AXIS