CORTIS STEVENS

MODELING UTAH POPULATION DATA

Math 1010 Intermediate Algebra Group Project

100

For all problems, please show your work and answer all questions using complete sentences.

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	1981	1989	1993	1999	2005	2008
x	1	9	13	19	25	28
Population, y	15.2	17.1	19	22	25	27.4

Source: U.S. Census Bureau, Population Division

1. Using graph paper, plot the data given in the table as ordered pairs.

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 (i.e., don't connect the dots).***

3. Estimate the coordinates of two points that fall on your best-fitting line. Use these points to find a linear function $f(x)$ for the line.

(5, 16), (23, 25)

$\frac{y_2 - y_1}{x_2 - x_1} = m$ $\quad (y - y_1) = m(x - x_1)$

$\frac{25-16}{23-5} = \frac{9}{18} \quad \frac{1}{2}$

.5

$y - 16 = .5(x - 5)$

$.5x - 2.5 + 16$

$y = .5x + 13.5$

4. What is the slope of your line? Interpret its meaning. Does it make sense in the context of this situation?

.5 -

The slope of the line makes sense because there is a growth in population from one year to the next.

5. Find the value of f(45). Write a sentence interpreting its meaning in context.

$y = .5(45) + 13.5$

$y = 22.5 + 13.5$

$y = 36\ (100{,}000)$

$y = 3{,}600{,}000$

By the year 2025 the estimated population will be close to 3,600,000 people living in the state

6. Use your function to approximate in what year the residential population of Utah reached 2,000,000.

$20 = .5x + 13.5$

$-13.5 \quad -13.5$

$\frac{6.5}{.5} = \frac{.5x}{.5}$

$13 = x$

$13 + 1980$

1993

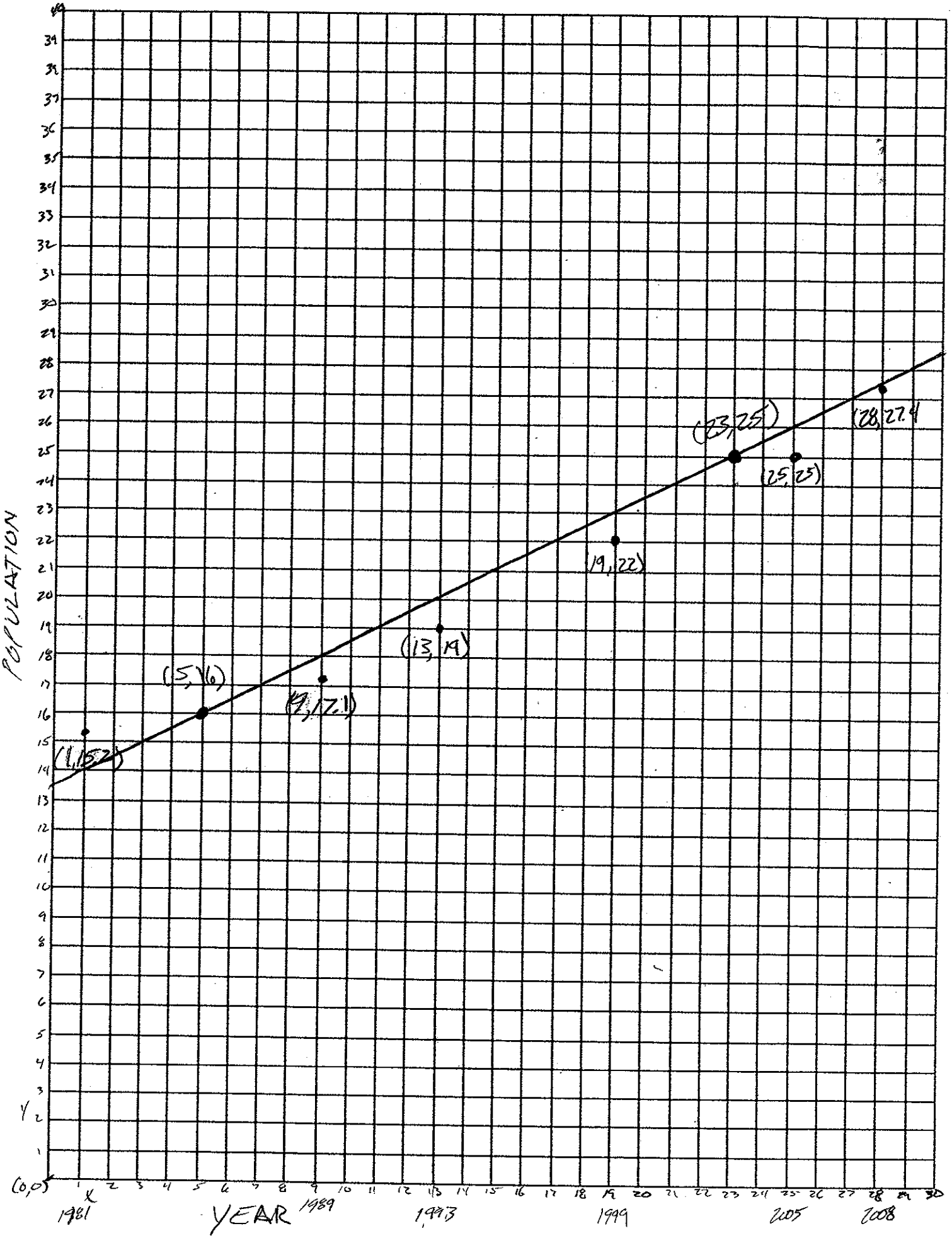
7. In actuality, using a linear growth model for population is not common. Most models are exponential models, due to the fact that most populations experience relative growth, i.e. 2% growth per year. Linear models for nonlinear relationships like population work only within a small time frame valid 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.

Their are variables that can happen year to year that could change the population growth rate. This model shows a growth rate, but over time the model could show a decrease in population. It is possible for some kind of dramatic change could happen such as natural disasters, illness. Even a sudden increase in population could happen because of land development. Using a linear equation shows the data, but it might not always be accurate.

8. **Reflective Writing. Did this project change the way you think about how math can be applied to the real world? Write one paragraph stating what ideas changed and why. If this project did not change the way you think, write how this project gave further evidence to support your existing opinion about applying math. Be specific.**

I feel that their is always a need for Math in the real world. Their is always seems to be a need to gather information for the future. If the population is growing, then their is a need to find out by how much. We need to know, because those people need to go somewhere. The housing market increases, new business come to area. Cities need this kind of information so they can plan accordenly.

Even in my own job, I am required to project yearly sales of Tootsie-Roll in grocery and Convenience Stores. Using Past information and current trends I can have a better idea what the sales are projected to be in the coming year.


POPULATION
YEAR
(0,0)
X
Y
1981
1989
1993
1999
2005
2008
(1,15.2)
(5,16)
(9,17.1)
(13,19)
(19,22)
(23,25)
(25,25)
(28,27.4)