More Linear Models

1. The cost of renting a 26-foot U-Haul truck is $39.95 per day and $0.59 per mile. Let \( f(x) \) represent the cost of renting a truck for a day and driving it “\( x \)” miles.
   a) How much will it cost to rent a truck for a day if the driver goes a total of 32 miles?
   b) What is the slope of the line given by this calculation of cost?
   c) If \( x = 0 \), how much does it cost to rent the truck for a day?
   d) Find the equation of the line.

2. A certain long distance company charges $5 a month for their service plus an additional $0.05 per minute on calls. If “\( x \)” represents the total number of minutes of long distance used during any given month and “\( f(x) \)” represents the cost of the bill for that month, find the following:
   a) Find the cost of a bill during a month where 250 minutes of long distance were used.
   b) What is the slope of the line given by this calculation of cost?
   c) If no long distance calls were made during a particular month, how much is the bill?
   d) Find the equation of the line.
   e) What does \( f(50) \) represent?

3. After 8 minutes, the altitude of an airplane above the runway is 6 thousand feet. After 12 minutes, the altitude of the same airplane is 9 thousand feet.
   a) What is the rate of change of the altitude per minute?
   b) What is the altitude of the airplane after 15 minutes?

4. According to the Census, the population of the Metro-Augusta area in 1990 was 415,184 and in 2000 was 477,441. Let “\( x \)” represent the year after 1990 and “\( f(x) \)” represent the number of people in Augusta “\( x \)” years after 1990.
   a) What is the rate of change of the population per year?
   b) If the rate of change remains the same, what is the expected population in 2010?

5. Assume that the sales of a certain appliance dealer are approximated by a linear function. Suppose that sales were $13,500 in 1982 and $65,500 in 1987. Let \( x = 0 \) represent 1982.
   a) What \( x \)-value represents 1987?
   b) If yearly sales is “\( y \)”, what is the slope of this line?
   c) Find the equation giving yearly sales.

6. Green Glass Recycling uses the function given by \( F(t) = -5000t + 90,000 \) to determine the salvage value in dollars of a waste removal truck \( t \) years after it has been put into use.
   a) What is the salvage value of the truck after it has been in operation for 6 years?
   b) How many years can the truck be used before the salvage value of the truck is $25,000?
   c) When is the value of the truck $0?
   d) What is the value of the truck at time of purchase?

7. The mathematical model \( C(x) = 450x + 25,000 \) represents the cost in dollars a company has in manufacturing “\( x \)” computers during a month. Based on this:
   a) How much does it cost the company if no computers are made a certain month?
   b) How many computers can be made for $115,000 in a certain month?
   c) How much will it cost the company during a month where 350 computers are made?

8. It is estimated that there were \( C(x) = 2.4x + 24 \) million homes in the U.S. with computers from 1991 to 2005. If “\( x \)” represents the years after 1991, find the following:
   a) What value of “\( x \)” represents 2000?
   b) Find the estimated number of computers in U.S. homes in the year 2000.
   c) In what year is it estimated that there are 50 million computers in U.S. homes?