

Berkeley College
GHW #7 Linear Modeling and Direct Variation

NAME _____

DATE _____

Show all work in the space provided. No credit will be given for answers without work shown.

Sketch the graph of the line

1. $y = \frac{1}{2}x + 1$

Find an equation of the line that has the given slope and y-intercept

2. Slope: $\frac{3}{2}$; y-intercept: (0, 3)

2. _____

Find an equation of the line that passes through the two points

3. (0, 4) and (7, 10)

3. _____

4. **Non-Wage Earners** The numbers of working-age civilians (in millions) in United States who were not involved in the labor force from 2000 through 2009 are given by the ordered pairs.

(2000, 70.0)	(2001, 71.4)	(2002, 72.7)
(2003, 74.7)	(2004, 76.0)	(2005, 76.8)
(2006, 77.4)	(2007, 78.7)	(2008, 79.5)
(2009, 81.7)		

A linear model that approximates the data is $y = 1.22t + 70.4, 0 \leq t \leq 9$ where y is the number of civilians (in millions) and $t = 0$ represents 2000. Plot the actual data with the model. How closely does the model represent the data?

4. _____

Direct Variation In Exercises 5 – 6, y is proportional to x . Use the x - and y - values to find a linear model that relates y and x .

5. $x = 5, y = 9$

5. _____

6. $x = 11, y = 1.5$

6. _____

Direct Variation In Exercise 7 write a linear model that relates the variables.

7. s is proportional to t ; $s = 32$ when $t = 4$.

7. _____

8. **Simple Interest** The simple interest received from an investment is directly proportional to the amount of the investment. By investing \$4000 in a municipal bond, you obtain interest of

\$280 at the end of 1 year. Find a mathematical model that gives the interest I at the end of 1 year in terms of the amount invested P .

8. _____

9. **Writing a Linear Equation** You are given the 2012 value of a product and the rate at which the value is expected to change during the next 5 years. Use this information to write a linear equation that gives the dollar value V of the product in terms of the year. (Let $t = 12$ represent 2012).

2012 Value	Rate
\$156	\$4.50 increase per year

9. _____

10. **Distance Traveled by a Car** You are driving at a constant speed. At 4:30 PM, you drive by the sign that gives the distance to Montgomery, Alabama as 84 miles. At 4:59 PM, you drive by another sign that gives the distance to Montgomery as 56 miles.

a) Write a linear equation that gives your distance from Montgomery in terms of the time t . (Let $t = 0$ represent 4:30 PM, and let t be measured in minutes). 10a. _____

b) Use the equation in part (a) to find the time when you will reach Montgomery. 10b. _____

11. **Straight-Line Depreciation** A business purchases a piece of equipment for \$25000. The equipment will be replaced in 10 years, at which time its salvage value is expected to be \$2000. Write a linear equation giving the value V of the equipment during the 10 years.

11. _____

12. **Pest Management** The cost of implementing an invasive species management system in a forest is related to the area of the forest. It costs \$630 to implement the system in a forest area of 10 acres. It costs \$1070 in a forest area of 18 acres.

a) Write a linear equation giving the cost of invasive species management system in terms of the number of acres x of forest. 12a. _____

b) Use the equation in part (a) to find the cost of implementing the system in a forest area of 30 acres. 12b. _____

13. **Revenue per Share** The revenues per share of stock y (in dollars) for California Pizza Kitchen for the years 2000 through 2009 are given by the ordered pairs.

(2000, 7.86)	(2001, 9.02)
(2002, 10.90)	(2003, 12.66)
(2004, 14.64)	(2005, 16.26)
(2006, 19.16)	(2007, 22.32)
(2008, 28.37)	(2009, 27.47)

- a) Use a graphing utility to create a scatter plot of the data. Let $t = 0$ represent 2000.
b) Use two points on the scatter plot to find an equation of a line that approximates the data.
c) Use the regression feature of the graphing utility to find a linear model for the data. Use this model and the model from part (b) to predict the revenues in 2010 and 2011.