College Algebra
Chapters 1 and 2.1, 2.2 Practice Test, Calculator Allowed

I. Solve the equation algebraically.

1. $\frac{1}{3}(r+6) = \frac{1}{6}(r+8)$
2. $-3.3q + 1.3 = -22.9 - 1.1q$

II. Find the slope-intercept form of the line passing through these points.

3. $(-6,-7) and\ (1,-1)$

III. Solve the following problems.

4. Suppose the sales of a particular brand of appliance (by units) are modeled by the linear function $S(x) = 80x + 2700$, where $S(x)$ represents the number of sales in year *x*, with $x = 0$ corresponding to 1982.
   a) Find the number of sales in 1994.
   b) What year were the sales 4220 units?
   c) What is the slope for this problem and interpret it in context?

5. Using a phone card to make a long distance call costs a flat fee of $0.54 plus $0.23 per minute starting with the first minute.
   a) Write the linear equation that represents the cost per call.
   b) Find the total cost of a phone call which lasts 21 minutes.
   c) How long was the call if the cost was $3.99?

6. The total number of inmates in custody between 1990 and 1998 in state and federal prisons is given approximately by $y = 68.476x + 728.654$ ***thousand*** prisoners, where *x* is the number of years after 1990. Assume the model remains accurate.
   a) What are the slope and its meaning for this problem?
   b) In what year will the number of inmates be 865.61 thousand. (to the nearest year)
   c) How many inmates were there in the year 1996?

7. Persons taking a 30-hour review course to prepare for a standardized exam average a score of 620 on that exam. Persons taking a 70-hour review course average a score of 763.
   a) Find a linear function $(y = mx + b\ form), S(t)$, which fits this data, and which expresses score as a function of time.
   b) Use the function to predict an average score for persons taking a 51-hour review course. Round your answer to the tenths place.

IV. Use best-fit linear modeling to solve the following problems.

8. The paired data below consists of the temperatures on randomly chosen days and the amount a certain kind of plant grew (in millimeters).

Temp	62	76	50	51	71	46	51	44	79
Growth	36	39	50	13	33	33	17	6	16

   a) Use linear regression to find a linear function that predicts a plant's growth as a function of temperature. (Round to four decimal places)
   b) Would this be a good model for the problem? Explain/support your answer.

9. The ages and lengths of several animals of the same species are recorded in the following table.

Age (months)	Length (inches)
12	9
15	12
17	20
21	21
26	24
28	27
32	35
38	40
41	40

a) Use linear regression to model the data, round to 4 decimal places.
b) State the value of "r" to 4 decimal places.
c) Is the linear equation a good fit for the data set? Explain/support your answer.
d) Use linear regression to predict the length of a 29-month-old animal.

Answers:

1. $r = -4$
2. $q = 11$
3. $y = \frac{6}{7}x - \frac{13}{7}$
4. a) $S(12) = 3660$
   b) 2001
   c) $m = 80$, each year there is an increase of 80 units sold.
5. a) $y = 0.23x + 0.54$
   b) A 21 minute call will cost \$5.37
   c) A call costing \$3.99 lasted 15 minutes.
6. a) $m = 68.476$, each year there is an increase of 68,476 inmates
   b) There will be 865.61 thousand inmates in 1992
   c) In 1996 there was 1,139,510 inmates.
7. a) $S(t) = 3.575x + 512.75$
   b) A person taking a 51-hour review should score 695.1 on the exam.
8. a) $f(x) = 0.2111x + 14.5692$
   b) Not a good fit since the value of $r = 0.1955$ is not close to 1 at all
9. a) $f(x) = 1.0869x - 2.4419$
   b) $r = 0.9805$
   c) Yes it is a good fit since the value of r is close to 1.
   d) $f(29) = 29.0782$; an animal 29 months old should be 29.1 inches long.