MATH 11009: Exam #1 (Spring 2009)

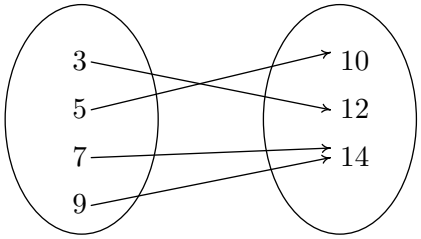
1. Determine which of the following are examples of functions.

   (a) $\{(3,2),\ (5,-8),\ (7,6),\ (5,4),\ (9,11)\}$

   (b)

x	3	6	9	12	15
y	-5	8	12	8	9

   (c)



2. Give an example of a **graph** that is **NOT** a function, and tell why it is not a function.

3. Given $P(n) = 4x^2 - 2x + 7$, find

   (a) $P(-3) =$ (b) $P(2) =$

4. Find the domain of $f(x) = \dfrac{\sqrt{5x+8}}{3x^2+11x+6}$

5. Find the slope of the line passing through $(-3,7)$ and $(8,-9)$.

6. The number of mobile-phone subscribers (**in millions**) after 1995 can be modeled by $S(x) = 11.75x + 32.95$, where x is the number of years after 1995. In what year does this model indicate that there were 68,200,000 subscribers?

7. Solve $\dfrac{3}{4}(2x-6) + \dfrac{2}{3}(3x+1) = 3$

8. A company builds and retails bicycles and the total cost is linear. The total cost of manufacturing 200 bicycles is $\$3,200$ and the total cost of manufacturing 450 bicycles is $\$5,350$.

   (a) Find the rate of change of the function.

(b) Interpret your answer to (a) in the context of this problem.

(c) Write a linear model for this problem, using y for the total cost and x for the number of bicycles.

9. For interstate calls, AT & T charges \$0.09 per minute plus a base charge of \$4.95 each month.

(a) Write an equation for the monthly charge y as a function of the number x of minutes of use.

(b) Find and **interpret** the vertical intercept of your model.

10. The following table gives the square feet of lawn remaining related to the amount of time spent mowing. under the influence.

t	0	5	10	15	20	25
area remaining	12,000	10,500	9,000	7,500	6,000	4,500

Determine if the above data set can be modeled exactly with a linear function, approximately linear, or nonlinear. **Explain how you know**.

11. A small appliance manufacturer finds that if he produces x microwaves in a month his production cost (in dollars) is given by equation $C(x) = 6x + 3000$.

(a) Find $C(150)$ and explain what it means.

(b) Find the cost of producing 25 microwaves and write this in function notation.

(c) Find slope and **interpret** its meaning in the context of the problem.

(d) Find the vertical intercept and **interpret** its meaning in the context of the problem.

12. Let $P = \left(\frac{1}{7}, \frac{8}{5}\right)$.

(a) Find the equation of the horizontal line passing through P.

(b) Find the equation of the vertical line passing through P.

ANSWERS

1. (a) not a function
   (b) function
   (c) function

2. Any graph which fails the vertical line test will work

3. (a) 49
   (b) 19

4. $x \geq -\frac{8}{5},\ x \neq -\frac{2}{3},\ x \neq -3$ (NOTE: not necessary to include $x \neq -3$ since $x \geq -\frac{8}{5}$ already excludes it).

5. $-\frac{16}{11}$

6. 1998

7. $x = \frac{41}{21}$

8. See homework #2

9. (a) $y = 0.09x + 4.95$
   (b) $b = 4.95$; If the number of minutes of use is zero, the monthly charge is \$4.95

10. Exactly linear; The first differences are constant for uniform inputs.

11. (a) $C(150) = 3900$; The cost of producing 150 microwaves is \$3900.
    (b) $C(25) = 3150$
    (c) $m = 6$; the production cost increases \$6 for each additional microwave produced.
    (d) $b = 3000$; The production cost is \$3000 to produce no microwaves.

12. (a) $y = \frac{8}{5}$
    (b) $x = \frac{1}{7}$