Name KEY

Math 103, Exam #1, Spring 2012

**Instructions**: Show all work. If you are using your calculator to solve, you may sketch a graph or indicate keys pressed to show work. Exact values: do not use decimals in your answers unless the problem begins with decimals, or is a word problem. All answers should be fully reduced for full credit.

1. Determine if each of the relations below are functions. State the domain and range of each relation. (5 points each)

   a. $\{(1,6),(2,4),(3,10),(4-1),(5,4)\}$

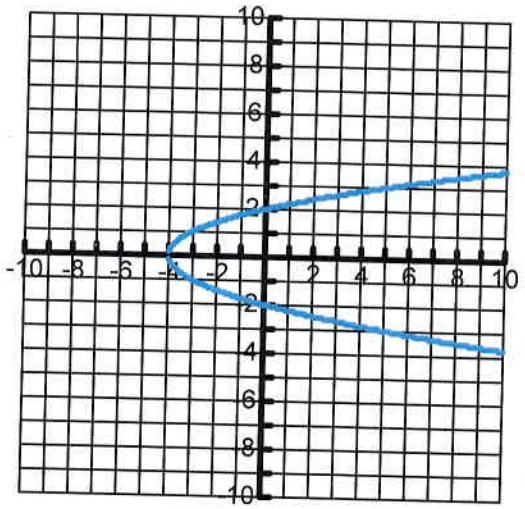
   YES, it is a function

   D: $\{1,2,3,4,5\}$ R: $\{6,4,10,-1\}$

   b. $y = x^3 + 1$

   yes D: $(-\infty, \infty)$ R: $(-\infty, \infty)$

   c.




NO

D: $[-4, \infty)$

R: $(-\infty, \infty)$

2. Find the value of the function at the specified points. (5 points each)

a. $f(h) = -h^2 + 5h - 1, f(4)$

$-(4)^2 + 5(4) - 1 = -16 + 20 - 1 = 4 - 1 = \boxed{3}$

b. $F(z) = \frac{z+2}{z-5}, F(4)$

$\frac{4+2}{4-5} = \frac{6}{-1} = \boxed{-6}$

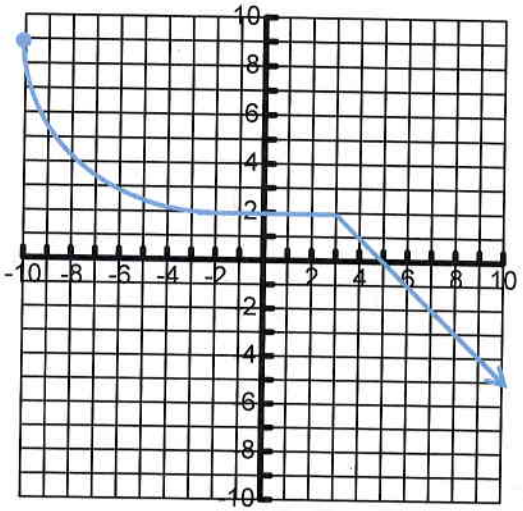
c. $H(x) = \sqrt{4x-3}, H(7)$

$\sqrt{4(7)-3} = \sqrt{28-3} = \sqrt{25} = \boxed{5}$

3. Suppose the function $R(p) = -p^2 + 200p$ represents the daily revenue earned from selling personal digital assistants (PDAs) at $p$ dollars for $0 \le p \le 200$. Explain why any $p$ greater than \$200 is not in the domain of the function. (5 points)

P values > 200 give negative revenue values. This does not correspond to the real world as the company would be giving away money.

4. For the graph f(x) below, answer each of the following equations. If the answers are not exact, do your best to estimate. (2 points each)




a. Find f(7) = $-2$

b. Find f(-2) = 2

c. X-intercept = 5

d. Y-intercept = 2

e. Domain $[-10, \infty)$

f. Range $(-\infty, 9]$

g. When is f(x)=4? $x = -8$

h. When is f(x)= -2? $x = 7$

i. What are the zeros of the function?

$x = 5$

5. Determine if the ordered pairs are a solution to the system. (5 points)

$$\begin{cases} x = -4y + 2 \\ 2x + 8y = 12 \end{cases}$$

a. (10,-1) b. (-1/2, 1/2) c. (2,1)

NO NO NO

$10 \stackrel{?}{=} -4(-1)+2$

$10 \neq 4+2=6$

$-\frac{1}{2} \stackrel{?}{=} -4(-\frac{1}{2})+2$

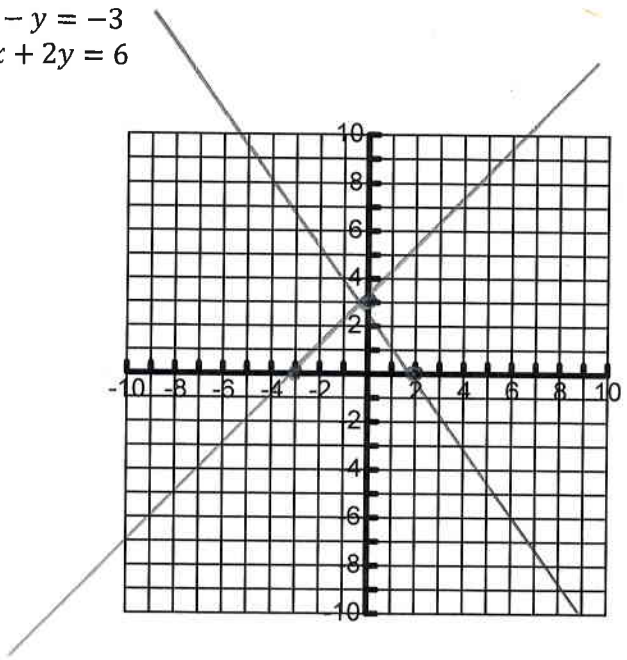
$-\frac{1}{2} \neq 2+2$

$2 \stackrel{?}{=} -4(1)+2$

$2 \neq -4+2$

6. Solve the system of equations by graphing. Sketch the graph on the axes provided [Hint: find the intercepts of each equation]. Be sure to clearly state the solution to the system and label it on the graph. Label the system consistent or inconsistent; and dependent or independent if applicable. (7 points)

$$\begin{cases} x - y = -3 \\ 3x + 2y = 6 \end{cases}$$




intersection
(0, 3)

consistent
independent

7. Solve the system of equations by substitution. Show all work to receive full credit. Be sure to clearly state the solution if one exists. . Label the system consistent or inconsistent; and dependent or independent if applicable. (7 points)

$$\begin{cases} x + 4y = 6 \\ y = 2x - 3 \end{cases}$$

$X + 4(2x - 3) = 6$

$X + 8X - 12 = 6$

$+12 \quad +12$

$\frac{9x}{9} = \frac{18}{9}$

$x = 2$

$y = 2(2) - 3$

$y = 4 - 3$

$y = 1$

(2, 1)
consistent
independent

8. Solve the system of equations by elimination by addition. Show all work to receive full credit. Be sure to clearly state the solution if one exists. . Label the system consistent or inconsistent; and dependent or independent if applicable. (7 points)

$$\begin{cases} 2x - y = 6 \\ 4x + 3y = 2 \end{cases}$$

$-2(2x - y = 6) \Rightarrow -4x + 2y = -12$

$4x + 3y = 2$

$\frac{5y}{5} = \frac{-10}{5}$

$y = -2$

$2x - y = 6$

$2x = y + 6$

$x = \frac{1}{2}y + 3$

$x = \frac{1}{2}(-2) + 3 = -1 + 3 = 2$

$(2, -2)$

consistent

independent

9. Solve the system of equations by any method. Show all work or sketch the graph to receive full credit. Be sure to clearly state the solution if one exists. . Label the system consistent or inconsistent; and dependent or independent if applicable. (7 points)

$$\begin{cases} 4y = 2x - 8 \\ x - 2y = -4 \end{cases}$$

$y = \frac{1}{2}x - 2$

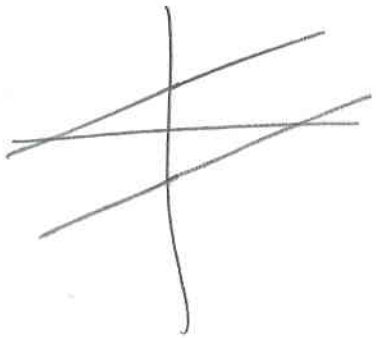
$\frac{x + 4}{2} = \frac{2y}{2}$

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

$\frac{1}{2}x - 2 = \frac{1}{2}x + 2$

$-2 = 2$

inconsistent



10. Solve the system of equations by any method. Show all work or sketch the graph to receive full credit. Be sure to clearly state the solution if one exists. . Label the system consistent or inconsistent; and dependent or independent if applicable. (7 points)

$$\begin{cases} 6x + 3y = 12 \\ y = -2x + 4 \end{cases}$$

$\frac{3y}{3} = \frac{-6x}{3} + \frac{12}{3}$

$y = -2x + 4$

$y = -2x + 4$ typo (z should be x)

Same equation

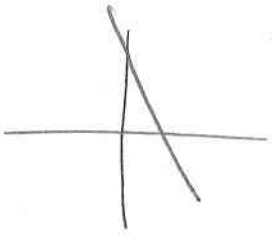
dependent

Consistent

$-2x + 4 = -2x + 4$

$0 = 0$

identity



11. The sum of two numbers is 58. If twice the smaller number is subtracted from the larger number, the difference is -20. Find the two numbers. (8 points)

$x + y = 58$

$-1(x - 2y = -20)$

$x + y = 58$

$-x + 2y = 20$

$\frac{3y}{3} = \frac{78}{3}$

$y = 26$

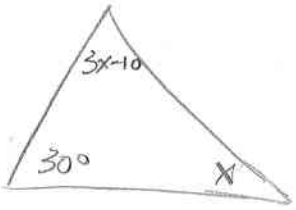
$x = 58 - 26$

$x = 32$

(32, 26)

12. In a triangle, the measure of the first angle is 10° less than three times the measure of the second angle. If the measure of the third angle is 30°, find the measure of the two unknown angles. (8 points)

1st $3x-10$
2nd $= x$
3rd $= 30°$




$3x - 10 + x + 30 = 180$

$4x + 20 = 180$
$-20 \quad -20$

$\frac{4x}{4} = \frac{160}{4}$

$x = 40$

$3(40) - 10 = 120 - 10 = 110$

1st = 110°
2nd = 40°
3rd = 30°

13. A baker wants to mix a 60% sugar solution with a 30% sugar solution to obtain 10 quarts of a 51% sugar solution. How much of the 30% sugar solution will the baker use? (9 points)

$x * .60 + y * .30 = 10 * .51$

$x + y = 10$

$y = 10 - x$

$.6x + .3(10 - x) = 5.1$

$.6x + 3 - .3x = 5.1$
$-3 \quad -3$

$\frac{.3x}{.3} = \frac{2.1}{.3}$

$x = 7$

$y = 10 - 7 = 3$

(7, 3)