

Name _____

Key

Test 1
College Algebra
MATH 1314
Mike Huff

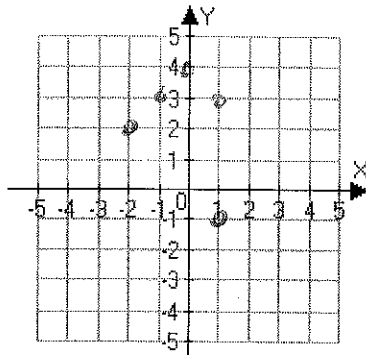
Deadline: 2/26/2010

Tools: Any calculator

(7 points)

1. Use the data in the table to answer the following questions.
- a. Create a scatterplot of the data.

Input	-2	-1	0	1	1
Output	2	3	4	3	-1



- b. State the domain $\{-2, -1, 0, 1\}$
- c. State the range. $\{-1, 2, 3, 4\}$
- d. Determine whether the given relation is a function or is not a function. no
- e. Does the relation have an inverse function? no

(4 points)

2. Write a function that describes the relationship between the two quantities: The number of inches as a function of the number of feet.

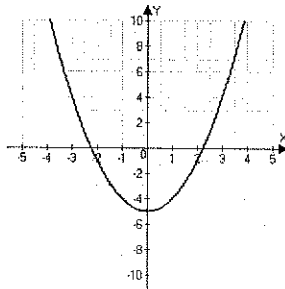
$x = \# \text{ of ft.}$

$$y = 12x$$

(4 points)

3. a. Use the vertical line test to determine whether the given relation is a function. *yes*
b. Use the horizontal line test to determine whether the given relation has an inverse function.

no



(6 points)

4. Let $f(x) = -2x^2 + 3x - 1$ and $g(x) = -\frac{4}{5}x - 2$.

a) Complete the table of values.

x	-1	-5
$f(x)$	-6	-66
$g(x)$	$-\frac{4}{5}$	2

- b) Find $g(-5) - f(-1)$

$$2 - (-6) = 8$$

- c) Find $f(-5) + g(-1)$

$$-66 + \frac{-6}{5} = \frac{-336}{5} = -67.2$$

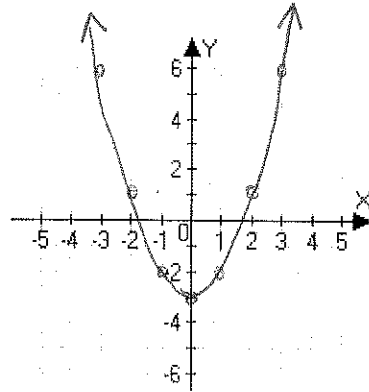
(6 points)

5. For the function $f(x) = x^2 - 3$, do the following:

a. Complete the table of values

x	-3	-2	-1	0	1	2	3
$f(x)$	6	1	-2	-3	-2	1	6

b. Draw a sketch of the function.



(4 points)

7. The time it takes to drive a certain distance is a function of distance you drive: $t = f(d)$ where t is the time (in hours) it takes to drive the distance and d is the distance (in miles) to be driven. Interpret the meaning of the following symbols.

a. $f(100)$ time it takes, ~~t~~ to drive 100 miles

b. $f(d) = 5$ d miles driven in 5 hours

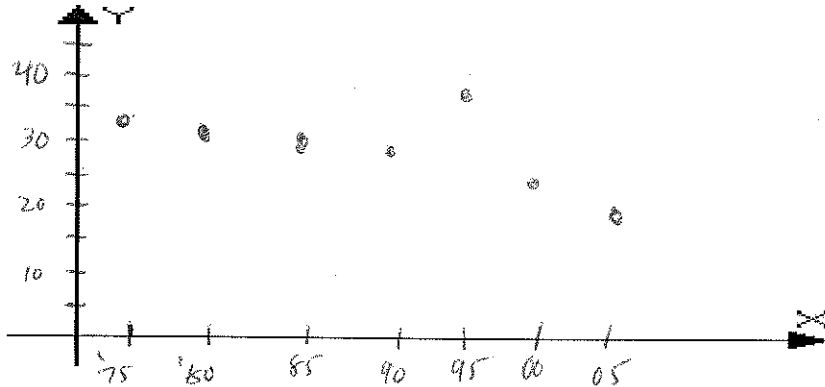
(7 points)

8. The table below shows the violent crime rate (per 1,000) for females for the given years. Violent crimes include here are homicide, rape, robbery, and simple and aggravated assault.

Year	1975	1980	1985	1990	1995	2000	2003
Violent Crime Rate	33.1	33.0	31.6	32.0	38.1	23.2	19.0

Source: Bureau of Justice Statistics

- a. Draw a scatterplot of the data with year as input and rate as output. Describe any trend in the data.



- b. During what year was the violent crime rate for females a maximum? A minimum?

1995 2003

- c. Find the percent change in the violent crime rate from 1980 to 2003.

$$\frac{19 - 33}{33} \times 100\% = -42\%$$

- d. Find the average rate of change in the violent crime rate from 1980 to 2003.

$$\frac{19 - 33}{2003 - 1980} = \frac{-14}{23} \approx -0.61$$

- e. Find and interpret $f(1995)$.

In 1995 the violent crime rate was 38.1 per 1000.

- f. Interpret $f(x) = 31.6$ and find the value of x that satisfies the function.

$x = 1985$ In 1985 the rate was 31.6 per 1000.

- g. Find and interpret $f^{-1}(32.0)$.

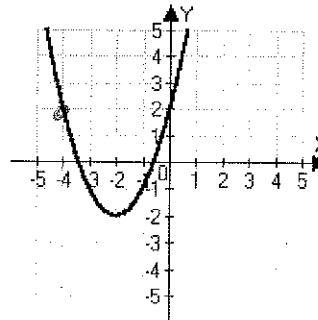
$f^{-1}(32) = 1990$ 1990 is the year in which the rate was 32.

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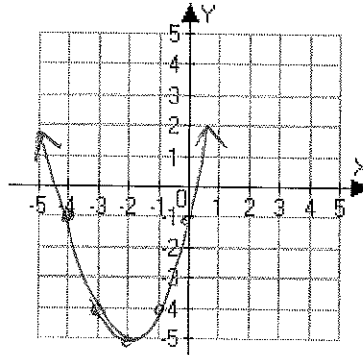
(6 points)

9. Use the graph to answer the following questions.
 a. Complete the tables of values using the given graph.

x	-4	-3	-2	-1	2
f(x)	2	-1	-2	-1	2



- b. Sketch the graph of $f(x) - 3$.



- c. Find $g(2)$ if $g(x) = f(x - 2) + 1$

$$g(2) = f(2-2) + 1 = f(0) + 1 = 2 + 1 = 3$$

(6 points)

10. Evaluate the function $f(x) = \sqrt{x-3}$ for the values given. If the value is not defined, explain why.

a. $f(1) = \sqrt{1-3}$ not defined since 1 is not in domain of f .

b. $f(7) = \sqrt{7-3} = \sqrt{4} = 2$

- c. Find the implied domain of the function $f(x) = \sqrt{x-3}$.

$$x-3 \geq 0$$

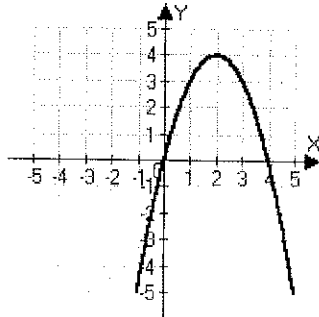
$$x \geq 3$$

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(7 points)

11. Approximate the following for the given function.

- a. Where is $f(x) = 0$? b. Where is $f(x) > 0$? c. Where is $f(x) < 0$? d. Where is $f(x)$ increasing?
- e. Where is $f(x)$ decreasing? f. If $f(x)$ has a maximum, where does the maximum occur and what is the maximum? g. If $f(x)$ has a minimum, where does the minimum occur and what is the minimum?



- a. $x=0, 4$ b. $0 < x < 4$ c. $x < 0$ or $x > 4$
- d. $x < 2$ e. $x > 2$ f. max is 4 at $x=2$
- g. none

(5 points)

12. Find the average rate of change of the function $h(t) = t^2 - 4$ between $t = 3$ and $t = 3.5$.

$$h(3.5) = 8.25$$

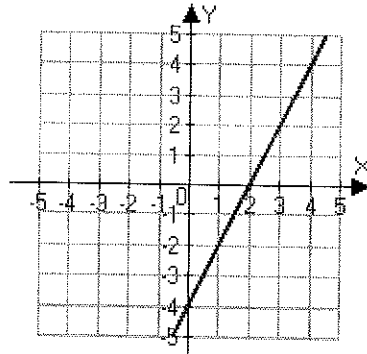
$$h(3) = 5$$

$$\begin{aligned} \text{ARC} &= \frac{h(3.5) - h(3)}{3.5 - 3} \\ &= \frac{8.25 - 5}{3.5 - 3} \\ &= \frac{3.25}{0.5} \\ &= 6.5 \end{aligned}$$

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(5 points)

13. Find the slope, y-intercept, and x-intercept of the following linear function and write a symbolic representation.

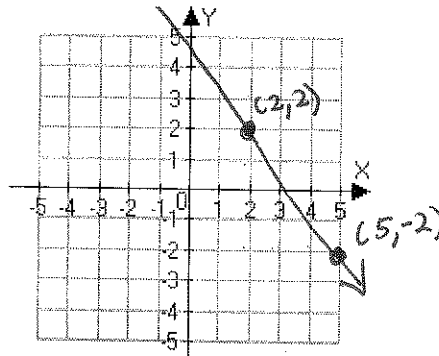


$m = \frac{4}{2} = 2$
y-int (0, -4)
x-int (2, 0)

$y = 2x - 4$

(4 points)

15. Graph the equation $y = -\frac{4}{3}(x - 2) + 2$.



(5 points)

16. Write an equation for line through the points $(-2, 5)$ and $(-1, -6)$.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-6 - 5}{-1 - (-2)} = \frac{-11}{-1 + 2} = -11$$

$$y = -11(x + 2) + 5$$

or
$$y = -11x - 17$$

(5 points)

17. A company that manufactures computer keyboards has fixed costs of \$3,500 per day and total costs of \$8,000 per day when 500 keyboards are made.

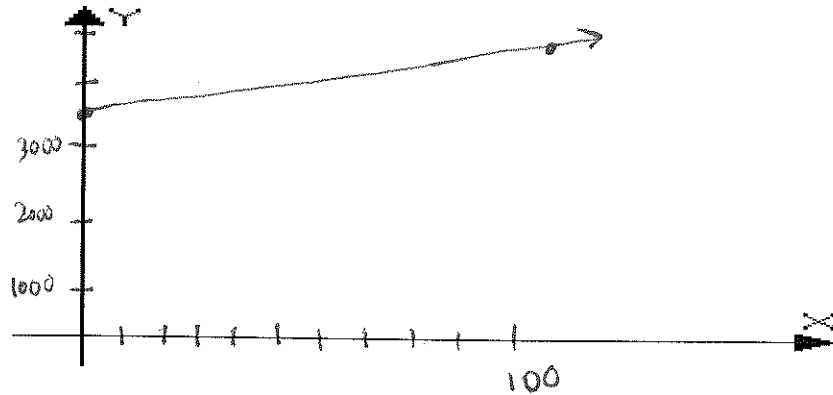
a. Write an equation that relates cost to the number of keyboards made.

$$y = 9x + 3500 \quad x = \# \text{ of Keybds.}$$

$$\begin{array}{r} 0 \quad 3500 \\ 500 \quad 8000 \end{array}$$

$$m = \frac{4500}{500} = 9$$

b. Graph the equation.



c. Interpret the slope and y-intercept in terms of the variables given.

$$m = \$9 \text{ per keybd made}$$

y-int (0, 3500) The cost is \$3500 if 0 Keyboards are made.

(5 points)

18. Write a linear equation for the line through the point $(-2, -4)$ parallel to the line $2x - 4y = 8$

Need slope of!

$$2x - 4y = 8$$

$$-4y = -2x + 8$$

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

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

$$m = \frac{1}{2}$$

$$y = m(x - x_1) + y_1$$

$$y = \frac{1}{2}(x + 2) - 4$$

or

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

(6 points)

19. The cost of a taxi ride is a function of the distance traveled during the ride.

- a. If it costs \$0.25 per mile, write a function $C(m)$ that gives total cost of a taxi ride if m miles are traveled.

$$C(m) = 0.25m$$

- b. Find the range of costs if the furthest a taxi can travel in the city is 50 miles, that is, if $0 \leq m \leq 50$.

range: $0 \leq C(m) \leq 12.50$

- c. If the ride costs \$2.00 and \$0.20 per mile, write a function $S(m)$ that gives total cost of a taxi ride if m miles are traveled. Find the range of costs if the furthest a taxi can travel in the city is 50 miles, that is, if $0 \leq m \leq 50$.

$$S(m) = 2 + 0.2m$$

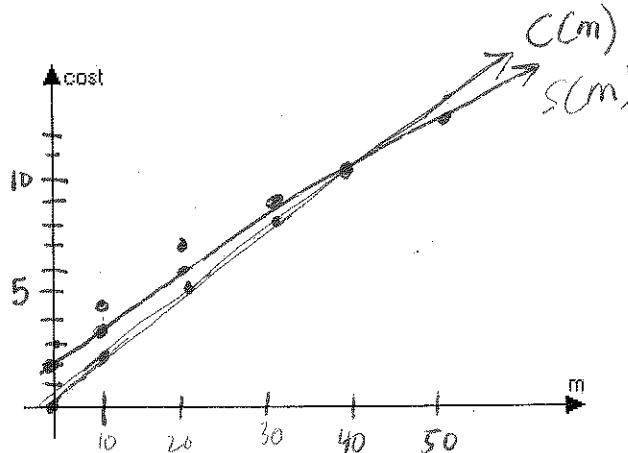
range:

(or) $S(m) = 0.2m + 2$

$$2 \leq S(m) \leq 12$$

- d. Fill in the following table of values. Graph both functions for $0 \leq t \leq 50$.

m	0	10	20	30	40	50
$C(m)$	0	2.5	5	7.5	10	12.5
$S(m)$	2	3	4	5	6	7



- e. Which taxi ride is a better deal? Explain.

$S(m)$ is cheaper if you go more than 40 miles.

$C(m)$ is cheaper if you go fewer than 40 miles.

Same cost at 40 miles.

(4 points)

20. Suppose $f(x)$ and $g(x)$ are defined by the following tables.

x	-3	-2	-1	0	1	2	3
$f(x)$	1	2	3	4	5	6	7

x	-3	-2	-1	0	1	2	3
$g(x)$	7	6	5	4	3	2	1

Find the following:

- a. $f(2)$ 6 b. $g(-3)$ 7 c. $f^{-1}(2)$ -2
d. $(f+g)(2)$ 8 e. $g^{-1}(6)$ -2 f. $f^{-1}(6)$ 2
g. $(fg)(-1)$ 15 h. $(f \circ g)(3)$ 5 i. $(g \circ f)(-2)$ 2

(4 points)

21. Let $f(x) = 2x - 5$ and $g(x) = 1 - 2x$ to find the following:

$$\text{a. } (f-g)(x) = 2x - 5 - (1 - 2x) = 2x - 5 - 1 + 2x$$

$$(f-g)(x) = 4x - 6$$

$$\text{b. } \left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{2x-5}{1-2x}$$