

Math 1210 College Algebra I
Exam Two: Sections 1.3, 1.4, R.4 and R.5
Tuesday, February 22, 2011

Name: Answer Key Version A

1. (2 pts each) For each statement below fill in the blank with the correct answer.

- a. If $f(-4) = 30$ then the point $(-4, 30)$ is on the graph of $f(x)$.
- b. The domain of the function $h(x) = \sqrt{x+4}$ is $\{x|x \geq -4\}$ or $x \geq -4$.
- c. The numerical value of the slope of the function $g(x) = 4 - 2x$ is -2 .
- d. The numerical value of the slope of a constant function is 0 .
- e. If $f(x) = 4$, then $f(-3) =$ 4 .

2. (2 pts each) For each function below determine if the function is:

A) Linear but not constant B) Linear and constant C) Constant but not linear D) Not Linear

- a. $f(x) = x + 3$ **A** b. $f(x) = |3x - 2|$ **D** c. $f(x) = -5$ **B**

3. (2 pts) Simplify the expression $\frac{-2x^{3/4}}{x^{5/6}}$. Assume that all variables are positive. Write answer without negative exponents.

$$= -2x^{3/4-5/6} = -2x^{-1/12} = \frac{-2}{x^{1/12}}$$

4. (3 pts) Fill in the blanks with the best word from the list at the left.

graph

range

relation

A function is a **relation** in which each element in the

vertical line

domain

domain corresponds to exactly one element in the **range**.

point

5. (4 pts) If possible, find the slope of the line passing through the points $(-4, 2)$ and $(4, -6)$.

$$\frac{-6 - 2}{4 - (-4)} = \frac{-8}{8} = -1$$

6. Carrie purchased the Bronze meal plan at BGSU. She found the function $M(x) = 1475 - 13.17x$ models the amount of money she has left after x days.

- a. (2 pts) Calculate $M(21)$

$$M(21) = 1475 - 13.17(21) = \boxed{1,198.43}$$

- b. (2 pts) Interpret the results of question **a** in context of the problem.

After 21 days Carrie has \$1,198.43 left.

- c. (2 pts) Interpret the slope as a rate of change in context of the problem.

Carrie spends \$13.17 per day.

7. Let $f(x) = x^2 - 4$.

- a. (2 pts) Evaluate $f(-4)$.

$$f(-4) = (-4)^2 - 4 = \boxed{12}$$

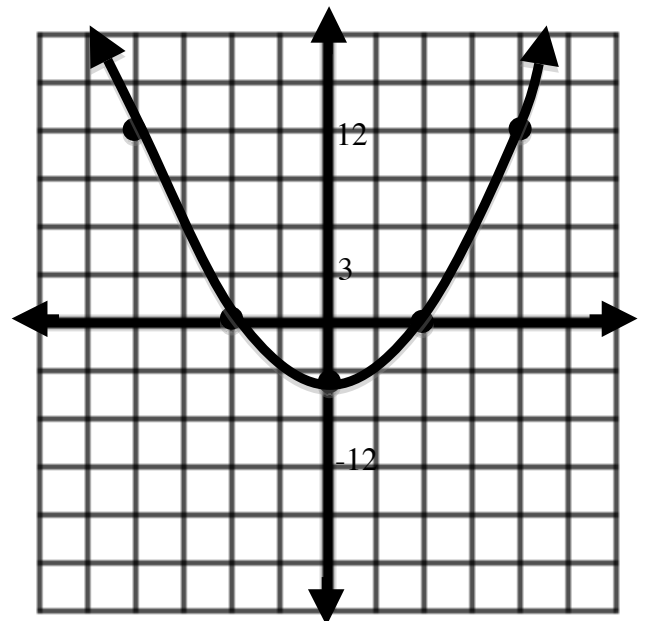
- b. (3 pts) Simplify $f(4a)$.

$$f(4a) = (4a)^2 - 4 = \boxed{16a^2 - 4}$$

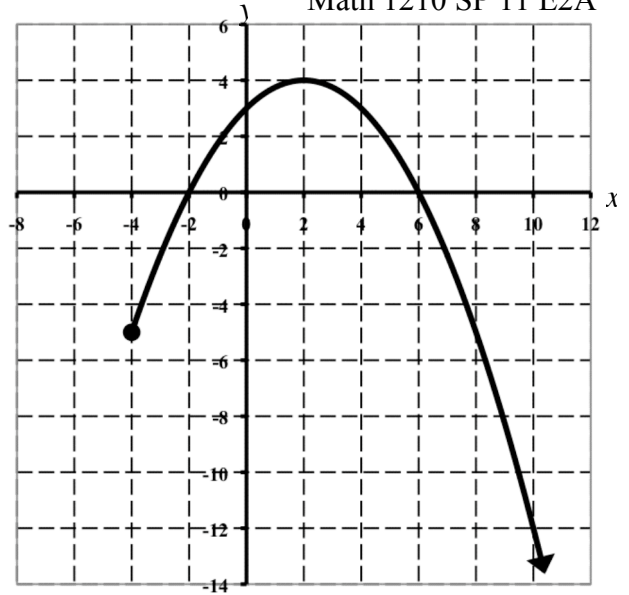
- c. (4 pts) Determine a numerical representation of $f(x)$ using a table with $x = -4, -2, 0, 2, 4$.

x	y
-4	12
-2	0
0	-4
2	0
4	12

- d. (5 pts) Determine the graphical representation of $f(x)$. Use the grid on the right. Make sure to include at least 3 points on the graph and capture the basic shape. We will assume that x -scale and y -scales are 1 unless stated otherwise.



8. Use the graph of the function $g(x)$ at the right to answer the following questions.



a. (4 pts) Evaluate $g(2)$ and $g(10)$.

$g(2) = \underline{\quad 4 \quad}$

$g(10) = \underline{\quad -12 \quad}$

b. (2 pts each) From the list below, indicate the interval that gives the domain and range.

Domain: **G**

Range: **D**

A) $\{x | -2 \leq x \leq 6\}$

D) $\{y | y \leq 4\}$

G) $\{x | x \geq -4\}$

B) $\{x | -8 \leq x \leq 12\}$

E) $\{x | x \leq 4\}$

H) $\{y | y \geq -4\}$

C) $\{y | -14 \leq y \leq 6\}$

F) All Real Numbers

I) $\{y | y \geq -5\}$

9. (4 pts) Lauren Prochaska recently broke the all-time scoring record for the BGSU Women's Basketball Team. Below shows how many points she had scored for the season for the given number of games. Could this data be modeled exactly by a linear function? **Show your work and explain your answer.**

Number of Games Played	3	6	8	10	17
Number of Points Scored	62	122	162	201	336

$m = \frac{122 - 62}{6 - 3} = 20$

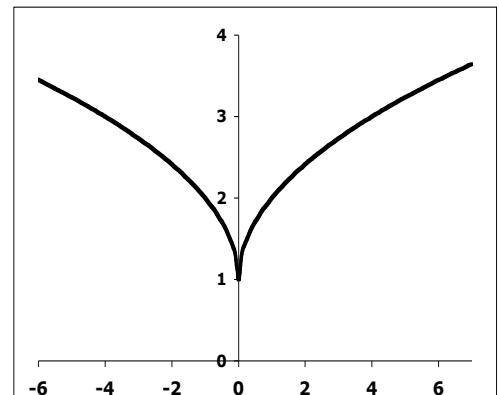
$m = \frac{162 - 122}{8 - 6} = 20$

$m = \frac{201 - 162}{10 - 8} = 19.5$

The data can not be modeled exactly by a linear function because the slope is not the same between all the points.

10. (3 pts) Does the graph at the right represent a function? **Explain your answer.**

The graph is a function because for each element in the domain corresponds to exactly one element in the range.



11. (2 pts) Factor $6x^3y + 2x^2y - 2xy$ completely.

$$2xy(3x^2 + x - 1)$$

12. (4 pts) Factor $x^3 + 3x^2 + x + 3$ completely.

$$x^2(x + 3) + 1(x + 3)$$

$$(x + 3)(x^2 + 1)$$

13. (4 pts) Factor $x^4 - 81$ completely.

$$(x^2 - 9)(x^2 + 9)$$

$$(x - 3)(x + 3)(x^2 + 9)$$

14. (4 pts) Factor $40 + 22x - 6x^2$ completely. You must check your answer to get full credit for the problem.

$$2(20 + 11x - 3x^2)$$

$$2(20 - 4x + 15x - 3x^2)$$

$$2[4(5 - x) + 3x(5 - x)]$$

$$2(5 - x)(4 + 3x)$$

Check

$$2(5 - x)(4 + 3x)$$

$$2(20 + 15x - 4x + 3x^2)$$

$$40 + 30x - 8x + 6x^2$$

$$40 + 22x + 6x^2$$

15. (2 pts) Find the least common multiple of $x^3(x - 4)$ and $(x - 4)^2(x + 3)$.

$$x^3(x - 4)^2(x + 3)$$

16. (4 pts) Simplify the expression $\frac{x^2 - 2x - 15}{25 - x^2}$.

$$\frac{(x-5)(x+3)}{(5-x)(5+x)} = \boxed{-\frac{x+3}{5+x}}$$

17. (5 pts) Divide and simplify $\frac{x^2 - x - 6}{(x-3)(2x-5)} \div \frac{2x^2 + 9x + 10}{6x-15}$

$$\frac{(x-3)(x+2)}{(x-3)(2x-5)} \cdot \frac{3(2x-5)}{(2x+5)(x+2)} = \boxed{\frac{3}{2x+5}}$$

18. (5 pts) Subtract and simplify $\frac{x^2 - 23}{x+4} - \frac{x-3}{x+4}$.

$$\frac{x^2 - 23 - x + 3}{x+4} = \frac{x^2 - x - 20}{x+4} = \frac{(x+4)(x-5)}{x+4} = \boxed{x-5}$$

19. (5 pts) Add and simplify $\frac{x}{(x+2)} + \frac{1}{(x+3)}$.

$$\frac{x}{x+2} \cdot \frac{x+3}{x+3} + \frac{1}{x+3} \cdot \frac{x+2}{x+2}$$

$$\frac{x^2 + 3x + x + 2}{(x+2)(x+3)} = \boxed{\frac{x^2 + 4x + 2}{(x+2)(x+3)}}$$

20. (5 pts) Simplify the expression $\frac{\frac{3}{x+4} + \frac{x}{x+4}}{\frac{5}{x+4} + \frac{2}{x}}$.

$$\frac{\frac{3+x}{x+4}}{\frac{5}{x+4} + \frac{2}{x} \cdot \frac{x+4}{x+4}}$$

$$= \frac{\frac{3+x}{x+4}}{\frac{5x+2x+8}{x(x+4)}} = \frac{3+x}{x+4} \div \frac{7x+8}{x(x+4)}$$

$$= \frac{3+x}{x+4} \cdot \frac{x(x+4)}{7x+8} = \boxed{\frac{x(3+x)}{7x+8}}$$