

**Math 100**

**Midterm**

Name \_\_\_\_\_

Section \_\_\_\_\_

Date \_\_\_\_\_

Score \_\_\_\_\_

**Show Work!**

1. Use order of operations to simplify.

$$\frac{4[-3+(6)^2 \div 2]}{6-2(3-6)} = \frac{4[-3+36 \div 2]}{6-2(-3)}$$

$$= \frac{4[-3+18]}{6+6} = \frac{4[15]}{12} = \frac{60}{12} = 5$$

5

4 points

2. Write the set using (a) **interval notation** and (b) **graph**.

$$\{x | x \leq -3\}$$

a.  $(-\infty, -3]$

2 points



2 points

3. Identify the **property** that justifies the statements?

- A. Identity property      B. Associative property      C. Commutative property  
D. Distributive property      E. Multiplication Property of Zero

a.  $6(5 + x) = 6(x + 5)$

a. C  
2 points

b.  $-4 + 0 = -4$

b. A  
2 points

4. Solve the equation.

$$\frac{3x-1}{2} = \frac{x+2}{5} + 3$$

$$10\left[\frac{3x-1}{2}\right] = 10\left[\frac{x+2}{5}\right] + 10(3)$$

$$5(3x-1) = 2(x+2) + 30 \Rightarrow 15x - 5 = 2x + 4 + 30$$

$$13x = 39$$

$$x = 3$$

4 points

5. a.) Solve the equation and give the solution set. b.) Identify the equation as a **conditional, an identity, or a contradiction**.

$$4x - 3(5 - 2x) = 6(x - 3) + 2x + 1$$

$$4x - 15 + 6x = 6x - 18 + 2x + 1$$

$$10x - 15 = 8x - 17$$

$$2x = -2$$

$$x = -1$$

a.  $\{-1\}$   
3 points

b. Conditional  
2 points

6. Solve the formula.

$B = cx + a$  for  $c$ .

$B - a = cx$

$\frac{B - a}{c} = x$

$x = \frac{B - a}{c}$   
3 points

7. To make a profit, a baker's sales of cookies must be greater than her costs to make them. The baker sells cookies at a price of \$2 that cost her \$1.50 to make. She also has basic costs of \$5 on each batch of cookies. How many cookies must she sell in a batch in order to make a profit. Write an inequality and solve.

Sales > Cost       $x = \text{number of cookies}$       more than 10  
5 points

$2x > 1.50x + 5$

$.50x > 5$

$x > \frac{5}{.50}$

$x > 10$

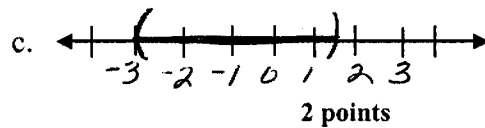
8. a. Solve the inequality. Give the solution set in  
b. interval and c. graph forms. (3 points)

$-5 < 2x + 1 < 4$

$-6 < 2x < 3$

$-3 < x < \frac{3}{2}$

b.  $(-3, \frac{3}{2})$   
2 points



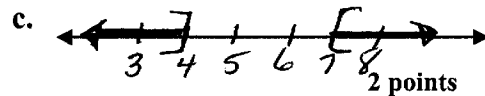
9. For the compound inequality, a. solve and give the solution set in

b. interval form and c. graph form. (3 points)      b.  $(-\infty, 4] \cup [7, \infty)$   
2 points

$3 + 2x \leq 11$  or  $x - 4 \geq 3$

$2x \leq 8$        $x \geq 7$

$x \leq 4$



10. Let  $A = \{0, 2\}$ ,  $B = \{1, 2, 3, 4\}$  and  $C = \{3, 4\}$ .

a. Find.  $B \cup C$

a.  $\{1, 2, 3, 4\}$   
2 points

b. Find.  $A \cap C$

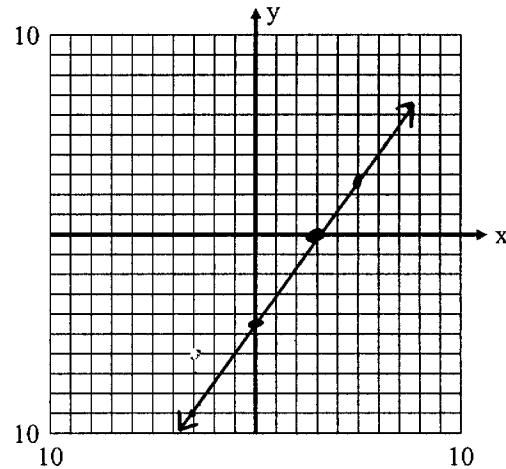
b.  $\{3\}$  or  $\emptyset$   
2 points

11. a. Complete the table of ordered pairs for the equation  $3x - 2y = 9$ .

x	y
3	0
0	$-\frac{9}{2}$
-3	-9
5	3

4 points

b. Graph the equation. (4 points)



12. If two points are on the same horizontal line, they have the same 4 coordinate.  
2 points

13. a. Find the **slope** of the line  $2x + 3y = 15$ .

$$3y = -2x + 15$$

$$y = -\frac{2}{3}x + 5$$

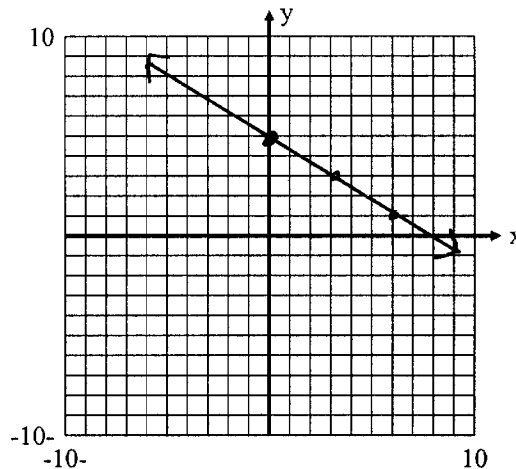
slope:  $-\frac{2}{3}$   
2 points

b. Find the **y-intercept**.

y-intercept:  $(0, 5)$   
2 points

c. **Graph** the equation.

(4 points)



14. Find an equation in **standard form** of the line through the points  $(-1, 5)$  and  $(2, 2)$ .  $AX + BY = C$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{2 - 5}{2 - (-1)} = \frac{-3}{3} = -1$$

$$x + y = 4$$

5 points

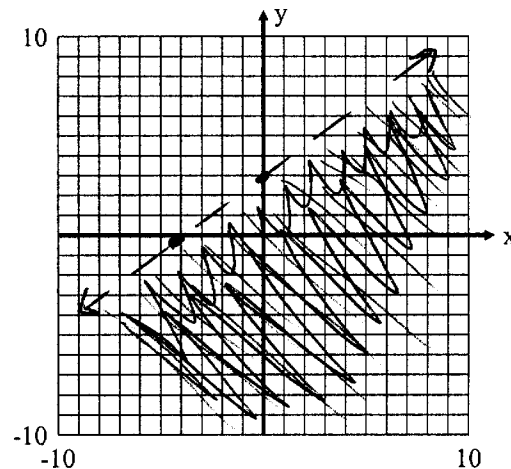
$$\begin{aligned} y - 5 &= -1(x + 1) \\ y - 5 &= -x - 1 \\ x + y &= 4 \end{aligned}$$

15. Write the equation of the line perpendicular to  $y = 4$ , through  $(2, 5)$ .

$$x = 2$$

4 points

16. Graph the inequality  $3x - 4y > -12$ .  
(5 points)



17. a. Explain why or why not that the relation is a function. Give b. the domain and c. the range.

(5 points)

$$R = \{(3, 2), (5, 5), (-6, 2), (2, 5)\}$$

- a. *It is a function because for each domain value there is exactly one corresponding range value.*

b. Domain:  $\{-6, 2, 3, 5\}$

c. Range:  $\{2, 5\}$

18. For  $f(x) = 3 - 4x$ , find :

a.  $f(-2) = 3 - 4(-2) = 3 + 8 = 11$

$$\frac{11}{2 \text{ points}}$$

b.  $f(3b) = 3 - 4(3b) = 3 - 12b$

$$\frac{3 - 12b}{2 \text{ points}}$$

c.  $f(x-1) = 3 - 4(x-1) = 3 - 4x + 4 = 7 - 4x$

$$\frac{7 - 4x}{2 \text{ points}}$$

19. Solve the system by **substitution or elimination** and write the solution in the form  $(x, y)$ .

$$\begin{array}{r} 2x + 3y = -8 \\ x - 2y = -4 \\ \hline 2x + 3y = -8 \\ -2x + 4y = 8 \\ \hline 7y = 0 \\ y = 0 \end{array}$$

$$\begin{array}{l} x - 2(0) = -4 \\ x = -4 \\ (-4, 0) \end{array}$$

$$\frac{\{(-4, 0)\}}{5 \text{ points}}$$

20. Select variables to represent the two unknowns, write two equations using the two variables, and solve the resulting system.

A woman wishes to invest \$8000 in two accounts. One account earns 4% interest and the other earns 7.5% interest. The interest for the first year needs to be \$425. How much should she invest in each account?

$x$  = amount at 4% interest  
 $y$  = amount at 7.5% interest

$$x + y = 8000$$

$$.04x + .075y = 425$$

$$-4x - 4y = -32000$$

$$4x + 7.5y = 42500$$

$$3.5y = 10500$$

$$y = \frac{10500}{3.5}$$

$$y = 3000$$

$$x = 8000 - 3000 = 5000$$

\$5000 @ 4%

\$3000 @ 7.5%

5 points