

Name: \_\_\_\_\_

Key

Recitation Instructor and Time: \_\_\_\_\_

**Studio College Algebra – Exam 1**  
**September 16, 2008**

**Directions: There are 16 problems on this exam. Please show all your work.**

1. Complete the following function table for  $f(x) = -4x^2 + 3x$ .

$x$	-2	-1	0	1	2
$f(x)$	-22	-7	0	-1	-10

$$\begin{aligned} f(-2) &= -4(-2)^2 + 3(-2) \\ &= -4(4) - 6 \\ &= -16 - 6 = -22 \end{aligned}$$

$$\begin{aligned} f(-1) &= -4(-1)^2 + 3(-1) \\ &= -4(1) - 3 \\ &= -7 \end{aligned}$$

$$f(0) = 0$$

$$\begin{aligned} f(1) &= -4(1)^2 + 3(1) \\ &= -4 + 3 = -1 \end{aligned}$$

$$\begin{aligned} f(2) &= -4(2)^2 + 3(2) \\ &= -4(4) + 6 \\ &= -16 + 6 = -10 \end{aligned}$$

2. Rewrite the formula  $K(g) = \frac{5b}{g+6b}$  at  $g = 4b$ , and simplify completely.

$$K(4b) = \frac{5b}{4b+6b} = \frac{5b}{10b} = \boxed{\frac{1}{2}}$$

3. Solve for  $x$ :  $24x - 13 = 13x + 31$ .

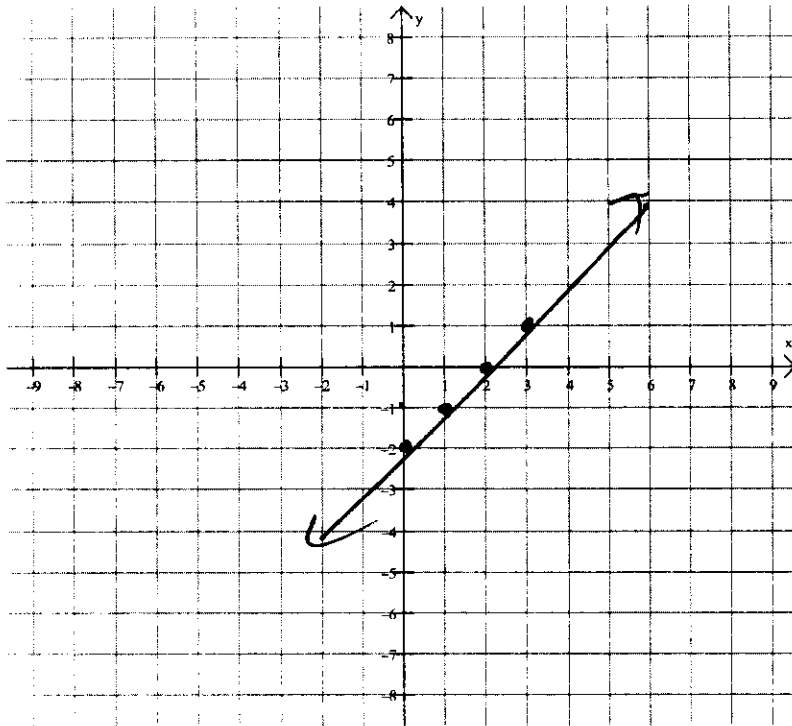
$$\begin{array}{r} 24x - 13 = 13x + 31 \\ -13x \quad \quad -13x \\ \hline 11x - 13 = 31 \\ \quad +13 \quad +13 \\ \hline 11x = 44 \\ \boxed{x = 4} \end{array}$$

4. Suppose  $x = 3$  solves  $Bx - 5 = 5x + B$ . Solve for  $B$ .

$$\begin{array}{r} B(3) - 5 = 5(3) + B \\ 3B - 5 = 15 + B \\ 2B = 20 \\ \boxed{B = 10} \end{array}$$

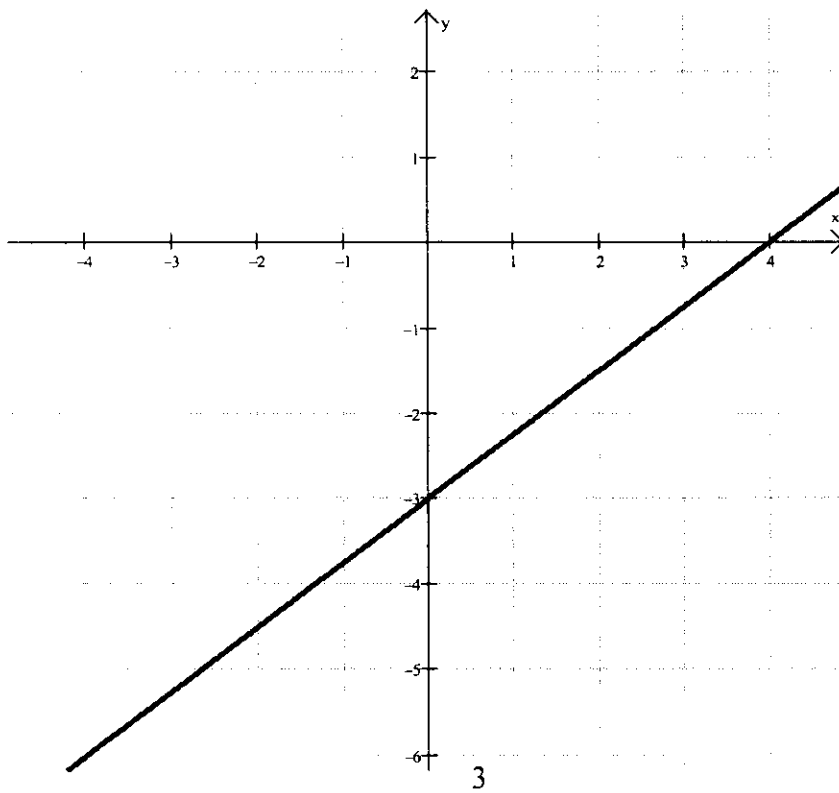
Name: \_\_\_\_\_

5. Graph  $5x - 5y = 10$  on the grid given below.



$$\begin{aligned} -5y &= -5x + 10 \\ \frac{-5y}{-5} &= \frac{-5x + 10}{-5} \\ y &= x - 2 \end{aligned}$$

6. Find the equation of the graph given below.



y-intercept:  
 $(0, -3)$

Slope:  $\frac{3}{4}$

$$y = \frac{3}{4}x - 3$$

7. Suppose a line passes through (4,2) and (6,5). What is another point on the line?

$$\text{Slope: } \frac{5-2}{6-4} = \frac{3}{2}$$

$$\text{Equation of line: } y-2 = \frac{3}{2}(x-4)$$

$$y-2 = \frac{3}{2}x - 6$$

$$(**) y = \frac{3}{2}x - 4$$

Plug any value of  $x$  (other than 4 and 6) <sup>into (\*\*)</sup> and you have an acceptable answer: (0, -4)

There are many ways of doing the problem that are still correct! or (2, -1), etc.

8. Solve:  $2x - 4 \leq 8 - 6x$

$$\begin{array}{r} 2x - 4 \leq 8 - 6x \\ +6x \qquad \qquad +6x \\ \hline \end{array}$$

$$\begin{array}{r} 8x - 4 \leq 8 \\ +4 \qquad +4 \\ \hline \end{array}$$

$$8x \leq 12$$

$$x \leq \frac{12}{8}$$

$$\boxed{x \leq \frac{3}{2}}$$

9. Solve:  $4x+1 < 7x+4 < 3x+8$ 

$$4x+1 < 7x+4 \quad \text{and} \quad 7x+4 < 3x+8$$

$$-3x+1 < 4 \quad \text{and} \quad 7x < 3x+4$$

$$-3x < 3 \quad \text{and} \quad 4x < 4$$

$$x > -1 \quad \text{and} \quad x < 1$$

$$\boxed{-1 < x < 1}$$

10. Solve the system for  $x$  and  $y$ , if possible. 
$$\begin{cases} 2x+y=5 \\ 2x-2y=-13 \end{cases}$$

$$\begin{cases} +2(2x+y=5) \\ 2x-2y=-13 \end{cases}$$

$$\begin{cases} +4x+2y=+10 \\ 2x-2y=-13 \end{cases}$$

$$\hline 6x = -3$$

$$x = -1/2$$

$$2(-1/2) + y = 5$$

$$-1 + y = 5$$

$$y = 6$$

$$\boxed{(-1/2, 6)}$$

Solution

11. The total price of a new fridge is \$1,298, including 7.3% sales tax. How much of the total price is sales tax (in dollars)?

Let  $c$  = cost of fridge before taxes

$$\text{Then } c + .073c = 1298 \text{ so}$$

$$1.073c = 1,298$$

$$\text{and } c = \frac{1,298}{1.073} = \$1,209.69$$

$$\text{So, } 1298 - 1209.69 = \boxed{\$88.31}$$

Sales tax in  
dollars.

12. The supply for a product is given by  $p - 2q = 120$ , and the demand for the product is given by  $p + 3q = 370$ . Find the equilibrium point.

$$\begin{cases} -1(p - 2q = 120) \\ p + 3q = 370 \end{cases}$$

$$\begin{cases} -p + 2q = -120 \\ p + 3q = 370 \end{cases}$$

$$5q = 250$$

$$\boxed{q = 50 \text{ units}}$$

$$\begin{aligned} p - 2(50) &= 120 \\ p - 100 &= 120 \end{aligned}$$

$$\boxed{p = \$220}$$

13. Suppose that in a certain town, the population (in thousands), between the years 1950 and 1960, could be modeled by the function  $P(x) = 1.343x + 2.13$ , where  $x$  is the number of years after 1950. In what year did the population pass 7,502 people?

$7.502 = 1.343x + 2.13$   
 (in thousands)  
 So you need to convert 7,502 to 7.502

$$5.372 = 1.343x$$

$$x = 4$$

In the year 1954

14. A taxi company depreciates its vehicles using a straight-line depreciation method. Suppose that a new taxi is initially worth \$12,000, and 30 years later it is worth \$0. How much is the taxi worth after 12 years?

$(0, 12,000)$   
 $(30, 0)$

$$m = \frac{12,000}{-30} = -400$$

$$y = -400x + 12,000$$

Plug in  $x = 12$

$$y = -400(12) + 12,000$$

$$= \$7200$$

15. The freezing point of water is 0 degrees Celsius, which corresponds to 32 degrees Fahrenheit. The boiling point of water is 100 degrees Celsius, which corresponds to 212 degrees Fahrenheit. If  $x$  represents temperature in Celsius and  $y$  represents temperature in Fahrenheit, we can describe the given information as the ordered pairs (0, 32), and (100, 212).

- a) What is the slope of the line connecting the points (0, 32), and (100, 212)?

$$m = \frac{212 - 32}{100 - 0} = \frac{180}{100} = \frac{9}{5}$$

- b) Find the equation of the line, in slope-intercept form, connecting the points in part (a).

$$y = mx + b$$

$$y = \frac{9}{5}x + 32$$

No work necessary, since  $b$  is given ( $x=0$  here)

16. Suppose the number of satellite television subscribers (in millions) between the years 2000 and 2007 could be described by the model  $P(x) = 22x + 15$ , where  $x$  is the number of years since 2000. Assuming the model hold for years past 2007, how many subscribers will there be in the year 2012?

$$P(12) = 22(12) + 15$$

$$= 279$$

279 million subscribers