Blane

Name: Key
Recitation-Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 1 – September 13, 2016

Directions: You will find 16 problems listed below. Each problem is worth 5 points. No notes/books/friends are allowed. Graphing calculator models above the level of a TI-84 plus are not allowed (in particular, calculators with a built in CAS and/or QWERTY keyboard are not allowed). You have one hour to complete this exam.

1. Consider $g(x) = 4x^2 + dx$, where d is some external parameter. Answer the following:

(a) Find $g(-2)$. $g(-2) = 4(-2)^2 + d(-2) = \boxed{16 - 2d}$

(b) Find $g(0)$. $g(0) = \boxed{0}$

(c) Find $g(1)$. $g(1) = 4(1)^2 + d(1) = \boxed{4 + d}$

(d) Find $g(-3)$. $g(-3) = 4(-3)^2 + d(-3) = \boxed{36 - 3d}$

(e) Find $g(4)$. $g(4) = 4(4)^2 + d(4) = \boxed{64 + 4d}$

2. Solve for x: $7(x + 1) - 2 = 2x - 3$
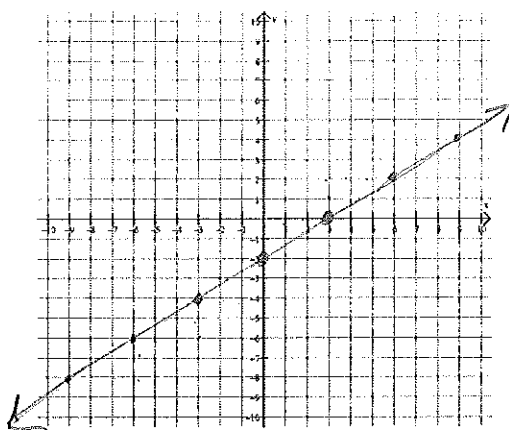
$$7x + 7 - 2 = 2x - 3$$
$$7x + 5 = 2x - 3$$
$$5x = -8$$
$$\boxed{x = -\frac{8}{5}}$$

Ian.

3. Graph $2x - 3y = 6$ on the grid below. Include all intercepts.

$-3y = -2x + 6$.

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

4. Solve $|x + 1| = 7x - 9$ and check your answers.

$x + 1 = 7x - 9$ or $x + 1 = -(7x - 9)$

$10 = 6x$ or $x + 1 = -7x + 9$

$\frac{5}{3} = x$ or $8x = 8;$ $x = 1$

Check $x = \frac{5}{3}$:

$|\frac{5}{3} + 1| = |\frac{8}{3}| = \frac{8}{3}$

$7(\frac{5}{3}) - \frac{27}{3} = \frac{8}{3}$ ✓

Check $x = 1$:

$|1 + 1| = 2$

$7(1) - 9 = -2$

     $x = 1$ not a solution

Only $x = \frac{5}{3}$ works.

2

Alex

5. Solve $|4x - 8| < 7$.

$-7 < 4x - 8 < 7$

$-7 < 4x - 8$ AND $4x - 8 < 7$

$1 < 4x$ AND $4x < 15$

$\frac{1}{4} < x$ AND $x < \frac{15}{4}$

$$\boxed{\begin{array}{c} \text{Solution:} \\ \frac{1}{4} < x < \frac{15}{4} \end{array}}$$

6. Solve $|3x + 4| > 2$.

$3x + 4 > 2$ OR $3x + 4 < -2$

$3x > -2$ OR $3x < -6$

$$\boxed{x > \frac{-2}{3} \quad \text{OR} \quad x < -2}$$

3

Michael

7. In a controlled lab environment, some organisms exhibit constant growth over a specific time period. Suppose a certain organism starts out weighing 2 mg, and grows to 2.5 mg over a 24 hour time period. Find a linear model that describes the growth of the organism for $0 \leq t \leq 24$ hours.

$(0, 2mg)$

$(24, 2.5mg)$

Slope: $\dfrac{2.5-2}{24-0} = \dfrac{.5}{24} = \dfrac{1}{48}$ mg/hr

model: $y = \dfrac{1}{48}t + 2$, where $0 \leq t \leq 24$,

(point slope form okay!) and y is in mg.

8. Suppose a line passes through (-5,1) and (3,4). Find the equation of this line.

Slope: $\dfrac{4-1}{3-(-5)} = \dfrac{3}{8}$

(either format is fine)

Point slope: $y - 4 = \dfrac{3}{8}(x-3)$

or

$y = \dfrac{3}{8}x - \dfrac{9}{8} + \dfrac{32}{8}$

$y = \dfrac{3}{8}x + \dfrac{23}{8}$ (Slope Intercept Form)

4

Brian

9. What is the domain of the function $f(x) = \dfrac{2x}{3x - 14}$?

$$X \neq \dfrac{14}{3}$$

10. The weekly profit function for a business is $P(x) = 30x - 200$, where x is the number of customers. How many more customers must the business add if it wants to increase profits by $900 per week?

$$\dfrac{900}{30} = 30 \qquad \left(\begin{array}{l} 1 \text{ customer} \\ \text{worth } \$30 \end{array}\right).$$

30 customers

Rekha

11. Given the function $C(x) = 20x + 1500$, which describes the total cost function of producing x digital picture frames, answer the following questions. Note: In context of this situation, x is a whole number greater than or equal to 0.

(a) What is the practical meaning of $C(0)$? Explain in a complete sentence.

$$C(0) = \$1500 \longrightarrow \text{fixed costs.}$$

The fixed cost for this situation is $1500.

(b) Find and interpret $C(30)$.

$$C(30) = 20(30) + 1500$$
$$= 600 + 1500$$
$$= \$2100$$

Interpretation:
The cost of producing 30 digital picture frames is $2100.

12. The equation $5F - 9C = 160$ gives the relationship between Fahrenheit and Celsius temperature measurements, where F is the temperature in Fahrenheit and C is the temperature in Celsius. What Celsius measure corresponds to a Fahrenheit measure of -40 degrees? Round your answer to the nearest tenth.

Plug in $F = -40$.

$$5(-40) - 9C = 160$$
$$-200 - 9C = 160.$$
$$-9C = 360$$
$$\boxed{C = -40°}$$

Cunshuna

13. Consider the function $f(x) = 4(x-1) + 15$. Answer the questions that follow.

(a) What is $f(4)$?

$$f(4) = 4(4-1) + 15 = 4(3) + 15 = 12 + 15 = \boxed{27}$$

(b) What is $f(0)$?

$$f(0) = 4(0-1) + 15 = 4(-1) + 15 = -4 + 15 = \boxed{11}$$

(c) What is the y-intercept of $f(x)$?

$$\boxed{(0, 11)}$$

(d) Solve $f(x) = 0$.

$$0 = 4(x-1) + 15; \quad 0 = 4x - 4 + 15; \quad -11 = 4x; \quad x = \frac{-11}{4}$$

(e) With respect to the graph of $f(x)$, what did you find in part(d) of this question? We are looking for a specific term related to graphing functions.

The x-intercept.

14. The revenue function for selling x juicers is given by $R(x) = 98x$, where $R(x)$ is in dollars. What is the marginal revenue for this situation?

$98 per juicer (the slope)

Matthew

15. Find M if $x = 2$ is a solution for $Mx + 9 = 2x + 4M$.

$$M(2) + 9 = 2(2) + 4M$$

$$5 = 2M$$

$$\boxed{M = \frac{5}{2}}$$

Matthew

16. A vehicle depreciates in value linearly. If the initial value of the vehicle is $36,000, and the value 20 years later is $0, answer the following questions.

(a) Find a linear function that gives the value of the car after t years.

$(0, 36000)$

$(20, 0)$

Slope: $\dfrac{-36000}{20} = -1800/\text{yr}$

(b) When will the car be worth $27,000?

$$\boxed{y = -1800x + 36000 \; (a)}$$

$$27000 = -1800x + 36000$$

$$-9000 = -1800x$$

$$\frac{9000}{1800} = x$$

$$x = 5.$$

$$\boxed{\text{After 5 years} \; (b)}$$