Name: Key
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 1 – February 3, 2015

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. Evaluate and complete the following function table for $f(t) = t^2 - 4kt$, where k is some unspecified parameter.

t	-2	-1	0	1	2
$f(t)$	$4+8k$	$1+4k$	0	$1-4k$	$4-8k$

$f(-2) = (-2)^2 - 4k(-2)$
$= 4 + 8k$

$f(-1) = (-1)^2 - 4k(-1)$
$= 1 + 4k$

$f(0) = 0 - 4k(0) = 0$

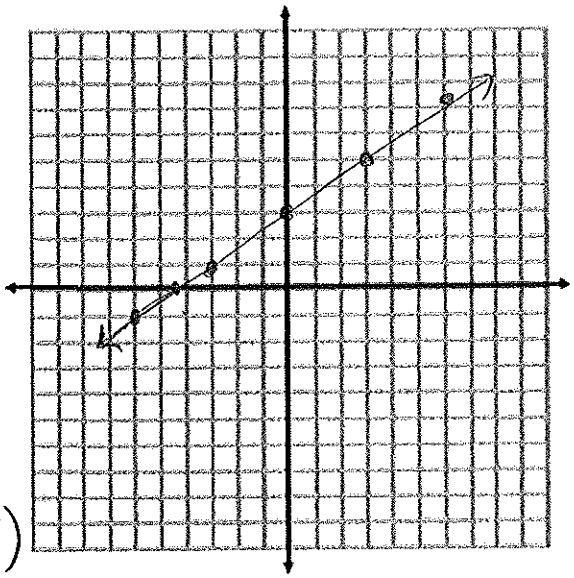
$f(1) = 1^2 - 4k(1)$
$= 1 - 4k$

$f(2) = 2^2 - 4k(2)$
$= 4 - 8k$

2. Solve for x: $9(x+1) = 4x - 3$

$9x + 9 = 4x - 3$
$5x = -12$
$x = \frac{-12}{5}$

3. Graph $-2x + 3y = 9$ on the grid below. Include all intercepts.



$\frac{3y}{3} = \frac{2x}{3} + \frac{9}{3}$

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

x-intercept is
$(-4.5, 0)$
(But don't mark off if this is not computed)

4. Solve $|x - 7| = 2x + 8$ and check your answers.

$x - 7 = 2x + 8$

$-15 = x$.

Check:

$|-15 - 7| = 22$.

$2(-15) + 8 = -22$

$x = -15$ doesn't work.

OR

$x - 7 = -(2x + 8)$

$x - 7 = -2x - 8$.

$3x = -1$.

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

Check:

$\left|-\frac{1}{3} - 7\right| = \frac{22}{3}$

$2\left(-\frac{1}{3}\right) + 8 = -\frac{2}{3} + \frac{24}{3} = \frac{22}{3}$

Only $x = -\frac{1}{3}$ works

5. Solve $|6x - 1| < 3$.

$$-3 < 6x - 1 < 3$$

$-3 < 6x - 1$ and $6x - 1 < 3$

$-2 < 6x$ and $6x < 4$

$-\frac{1}{3} < x$ and $x < \frac{2}{3}$

$$\boxed{-\frac{1}{3} < x < \frac{2}{3}}$$

6. Solve $|5x + 1| > 2$.

$5x + 1 > 2$ or $5x + 1 < -2$.

$5x > 1$ or $5x < -3$

$$\boxed{x > \frac{1}{5} \quad \text{or} \quad x < -\frac{3}{5}}$$

7. A truck depreciates in value according to a linear model. If the initial value of the truck is $36,000, and the value thirty years later is $0, what was the depreciated value of the truck after 9 years?

$$\frac{36000-0}{0-30} = \frac{-3600}{3} = -1200/\text{yr}.$$

$$-(1200)(9)+36000 = -10800+36000$$

$$= \boxed{\$25,200}$$

Value after 9 yrs.

8. Suppose a line passes through (1,2) and (-5,7). What is another point on the line? Show work and/or explain how you arrived at your answer.

Slope: $\frac{7-2}{-5-1} = \frac{5}{-6}$. $\frac{\text{rise}}{\text{run}}$.

One method: add 5 to y-value 7 in $(-5,7)$ and subtract 6 from x-value -5 in $(-5,7)$

One possible Answer: $(-11,12)$

Or, find equation of line:

$$y-2 = \frac{-5}{6}(x-1)$$

$$y = \frac{-5}{6}(x-1)+2$$

$$\left(x, \frac{-5}{6}(x-1)+2\right)$$

$$= \left(x, \frac{-5}{6}x+\frac{17}{6}\right)$$

general answer.

9. What is the domain of the function $f(x) = \dfrac{4x}{2x-7}$?

$2x - 7 = 0$.

$2x = 7$

$x = \frac{7}{2}$.

All real #s except $x = \frac{7}{2}$.

10. The weekly profit function for a business is $P(x) = 15x - 300$, where x is the number of customers. How many more customers must the business add if it wants to increase profits by \$750 per week?

$\frac{750}{15} =$ 50 customers

11. The temperature T in degrees Fahrenheit inside a concert hall m minutes after a power outage during a winter concert is given by $T(m) = -0.5m + 80$. What is the meaning of the slope in this function?

$-.5 \frac{\text{degrees}}{\text{minute}}$.

The temp drops $.5^\circ$ every minute.

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 82 degrees? Round your answer to the nearest tenth.

$5(82) - 9C = 160$.

$410 - 9C = 160$

$-9C = -250$

$\boxed{C = 27.8^\circ}$

13. If the number of cell phone subscribers (in millions) between the years 1993 and 1997 is described by the model $P(x) = 10.25x + 36$, where x is the number of years since 1993. Find and interpret the meaning of $P(2)$.

$P(2) = 10.25(2) + 36$

$= 56.5$

There were 56.5 million subscribers in 1995.

14. Suppose the cost function for a certain product is given by $C(x) = 25x + 400$ and the revenue function for the product is given by $R(x) = 55x$. Find a profit function for this situation.

$\text{Profit} = R(x) - C(x)$

$= 55x - (25x + 400)$

$P(x) = 30x - 400$

15. Find M if $x = 4$ is a solution for $Mx - 2 = 7x + M$.

$M(4) - 2 = 7(4) + M$

$4M - 2 = 28 + M$

$3M = 30$

$\boxed{M = 10}$

16. Find a linear model that fits the data set given below.

x	-4	2	8	14	20
y	-2	-4	-6	-8	-10

$\frac{\text{rise}}{\text{run}} = \frac{-2}{6} = -\frac{1}{3}$

$y = mx + b$

$-2 = -\frac{1}{3}(-4) + b$

$-2 = \frac{4}{3} + b$

$-\frac{6}{3} - \frac{4}{3} = b$

$-\frac{10}{3} = b$

$\boxed{y = -\frac{1}{3}x - \frac{10}{3}}$