Name: Key
Recitation Instructor:
Recitation Day and Time:

Studio College Algebra – Exam 1 – Spring 2017

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 $g(x) = 3x^2 - 4dx$, where d is some external parameter. Answer the following:

   (a) Find $g(-2)$. $g(-2) = 3(4) - 4d(-2) = 12 + 8d$

   (b) Find $g(-1)$. $g(-1) = 3(1) - 4d(-1) = 3 + 4d$

   (c) Find $g(0)$. $g(0) = 0$.

   (d) Find $g(1)$. $g(1) = 3(1) - 4d(1) = 3 - 4d$

   (e) Find $g(2)$. $g(2) = 3(4) - 4d(2) = 12 - 8d$

2. Solve for x in the equation $3(2x + 1) + 5 = 2x - 9$.

$$6x + 3 + 5 = 2x - 9$$

$$6x + 8 = 2x - 9$$

$$4x = -17$$

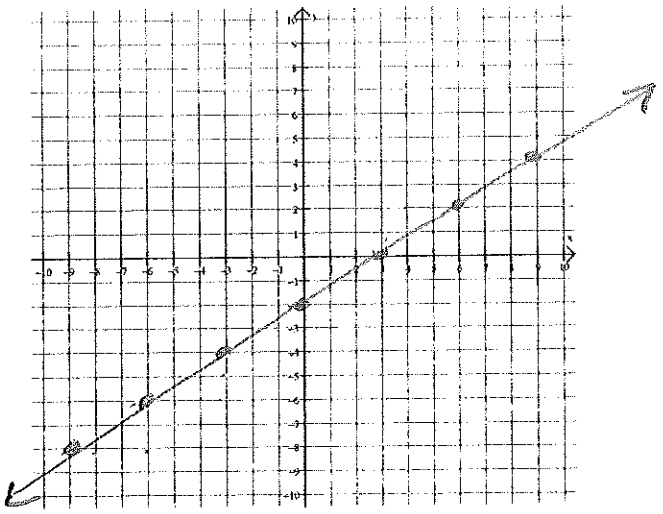
$$\boxed{x = \frac{-17}{4}}$$

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

$-3y = -2x + 6$

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

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



4. Solve $|x - 1| = 2x + 5$ and check your answers.

$x - 1 = 2x + 5$ OR $x - 1 = -2x - 5$

$-6 = x$ OR $3x = -4$

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

Check:

$|-6 - 1| \neq 2(-6) + 5$

$x = -6$ not a solution.

Check:

$\left|-\frac{4}{3} - 1\right| = \frac{-8}{3} + \frac{15}{3}$ ✓

Only $x = -\frac{4}{3}$ works

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

$-8 < x - 7 < 8$

$-8 < x - 7$ and $x - 7 < 8$

$-1 < x$ and $x < 15$

$-1 < x < 15$

6. Solve $|x + 3| > 12$.

$x + 3 > 12$ OR $x + 3 < -12$

$x > 9$ OR $x < -15$

7. A truck depreciates in value according to a linear model. If the initial value of the truck is $40,000, and the value twenty years later is $0, what was the depreciated value of the truck after 13 years?

$$20 \overline{)\,40{,}000}\quad 2000$$

Truck loses $2000 per year

$y = -2000x + 40{,}000$ x: # of years that go by

when $x = 13$,

$y = -2000(13) + 40000$

$= \boxed{\$14000}$ depreciated value of truck

8. Suppose a line passes through (0,2) and (-5,9). What is the equation of the line passing through these points?

Slope: $\frac{9-2}{-5-0} = \frac{7}{-5}$

$y = mx + b$.

$\boxed{y = \frac{-7}{5}x + 2}$

Note:
(0,2)
is the
y-intercept
so that
makes this
problem
quicker to
finish up!

9. What is the domain of the function $f(x) = \dfrac{4}{3x-9}$?

$x \neq 3$

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

Note:
This problem was very, very similar to Spring 2016 exam 1 on the exam archive.

11. The temperature T in degrees Fahrenheit inside a concert hall m minutes after a power outage during a winter concert is given by $T(m) = -0.4m + 80$. What is the meaning of the y-intercept in this function?

At the start of the power outage, the temperature is 80° F.

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 64 degrees? Round your answer to the nearest tenth.

$F = 64$;

$5(64) - 9C = 160$.

$320 - 9C = 160$

$-9C = -260$

$C = \frac{260}{9}°$

13. Suppose the number of cell phone subscribers (in millions) between the years 1993 and 1997 is described by the model $P(x) = 12.25x + 28$, where x is the number of years since 1993. Find and interpret the meaning of $P(2)$.

$P(2) = 12.25(2) + 28$

$= 24.5 + 28$

$= 52.5$

In 1995, the number of cellphone subscribers was 52.5 million

14. Suppose the total cost function for a certain product is given by $C(x) = 35x + 100$ and the revenue function for the product is given by $R(x) = 75x$. Find a profit function for this situation.

$P(x) = R(x) - C(x)$

$= 75x - (35x + 100)$

$= 40x - 100$

15. Find M if $x = 2$ is a solution for $Mx + 9 = 3x - M$.

$2M + 9 = 6 - M$

$3M = -3$

$\boxed{M = -1}$

16. In a controlled lab environment, some organisms exhibit constant growth over a specific time period. Suppose a certain organism starts out weighing 10 mg, and grows to 14 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. (Hint: Find a linear function $f(t) = mt + b$ that fits with this situation with m and b filled in. You will have to figure out what m and b are for this situation. We want the actual function, not just a graph or picture.)

$(0, 10\text{mg})$

$(24, 14\text{mg})$

$\frac{14-10}{24-0} = \frac{4}{24} = \frac{1}{6}$ mg/hr

$\boxed{f(t) = \frac{1}{6}t + 10}$