Name: Roy

Recitation Instructor and Time: ______________

Studio College Algebra – Exam 1
June 19, 2008

Directions: There are 16 problems on this exam. Please show all your work. Problems 1-13 are worth 5 points each; problem 14 is worth 15 points.

1. Complete the following function table for $f(x) = 5x^2 - 3\Delta$, where Δ is some parameter.

x	-2	-1	0	1	2
$f(x)$	$20-3\Delta$	$5-3\Delta$	-3Δ	$5-3\Delta$	$20-3\Delta$

2. Rewrite the formula $a(y) = \dfrac{3c}{y+7c}$ at $y = 5c$, and simplify completely.

$$a(5c) = \frac{3c}{5c+7c} = \frac{3c}{12c} = \boxed{\frac{1}{4}}$$

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3. Solve for x: $10 - 4x = 6x - 2$.

$12 = 10x$

$\frac{12}{10} = x$

$\boxed{\frac{6}{5} = x}$

4. Suppose $x = 3$ solves $Ax - 4 = 2x + A$. Solve for A.

$A(3) - 4 = 2(3) + A$

$3A - 4 = 6 + A$

$2A = 10$

$\boxed{A = 5}$

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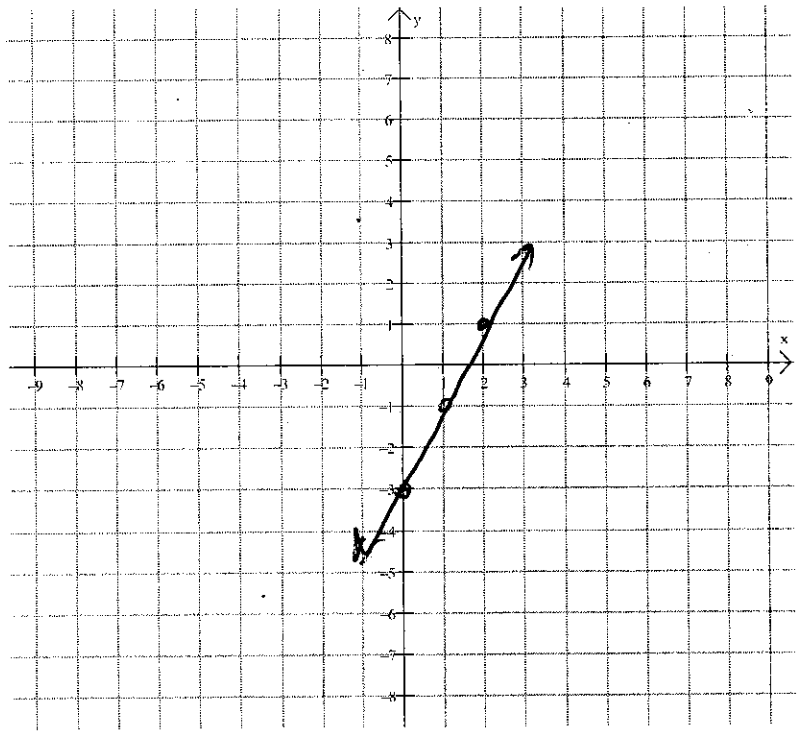
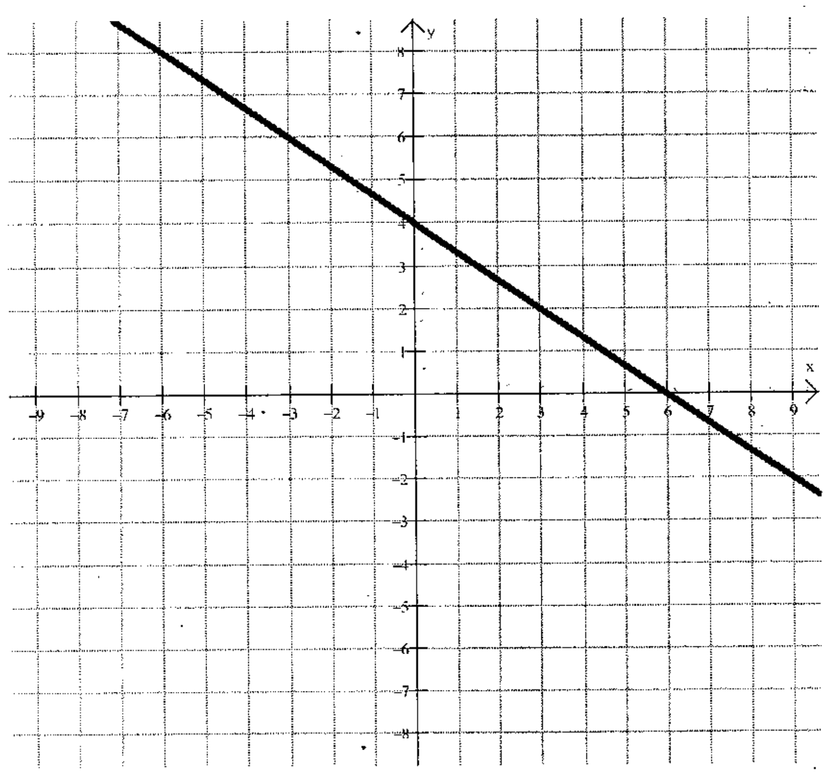
5. Graph $2x - y = 3$ on the grid given below. $y = 2x - 3$



6. Find an equation of a line **parallel** to the line given below.



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

Any line of the form $y = \frac{-2}{3}x + b$, $b \neq 4$

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7. Suppose a line passes through (5,2) and (9,7). What is another point on the line?

$$m = \frac{\Delta y}{\Delta x} = \frac{y_1 - y_2}{x_1 - x_2} = \frac{2-7}{5-9} = \frac{-5}{-4} = \frac{5}{4}$$

$$y = \frac{5}{4}x + b$$

$$7 = \frac{5}{4}(9) + b$$

$$7 = \frac{45}{4} + b$$

$$\frac{28}{4} - \frac{45}{4} = b$$

$$b = -\frac{17}{4}$$

$$y = \frac{5}{4}x - \frac{17}{4}$$

Any point satisfying.

So, (13, 12) for instance, or (1, -3).

8. Solve: $5x - 7 > 9 + 3x$

$$2x > 16$$

$$\boxed{x > 8}$$

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9. Solve: $x+7<4x+9<2x+12$

$x+7<4x+9$ AND $4x+9<2x+12$

$-3x<2$ $\quad$ $2x<3$

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

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

10. Solve the system for x and y, if possible. $\begin{cases} x+2y=7 \\ (2x-y=-1)\,2 \end{cases}$

$x+2y=7$
$4x-2y=-2$
$5x=5$
$x=1$

$1+2y=7$
$2y=6$
$y=3$

$\boxed{(1,3)}$

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11. A business uses a straight line depreciation to estimate the value of some office equipment. If the initial value of the equipment is $40,000, and the value 40 years later is $0, what will the depreciated value be after 10 years?

(0, 40,000)

(40, 0)

$\frac{40,000}{-40} = -\$1000/\text{year}$

$y = -1000x + 40000$

Plugging in $x = 10$ gives

$-10,000 + 40,000 = \boxed{\$30,000 \text{ value after } 10 \text{ yrs}}$

12. In a certain class, one must take 4 exams and a final. If a student has an average of at least 90% on the 4 chapter exams, then the student is exempt from taking the final (this is NOT true for our class). Suppose someone has earned an 82, 88, and 94 on the first three exams, and is about to take the last 100 point exam. Write and solve an inequality that describes the minimum score needed on the fourth exam to be exempt from taking the final exam.

Let $x = 4^{th}$ score.

$\frac{x + 82 + 88 + 94}{4} \geq 90$

$\frac{x + 264}{4} \geq 90$

$x + 264 \geq 360$

$\boxed{x \geq 96\%}$

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13. A concert organizer needs to make $86,000 by selling 2000 tickets. The organizer charges $45 for some seats and $25 for the other seats. How many tickets of each type must be sold to make $86,000? You must show all your work and find the solution; guessing and checking will not receive much credit.

Let x = # of $45 seats
y = # of $25 seats

$$\begin{cases} x+y=2000 \\ 45x+25y=86000 \end{cases}$$

$$\begin{cases} -25\,(x+y=2000) \\ 45x+25y=86{,}000 \end{cases}$$

$$\begin{cases} -25x-25y=-50{,}000 \\ 45x+25y=86{,}000 \end{cases}$$

$$20x = 36{,}000$$

$$\boxed{\begin{aligned} x &= 1800 \text{ tickets} \\ y &= 200 \text{ tickets.} \end{aligned}}$$

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14. A wholesaler will supply 80 widgets if the price is \$10 each and 100 widgets if the price is \$12 each. A retail chain will buy 60 of these widgets if the price is \$10 each and 80 widgets if the price is \$8 each.

a) Assuming that the demand function is linear, what is the demand equation for this situation? (Hint: Use the information given above about the retail chain and write the information as ordered pairs. Here, (q,p) represents quantity and price, in that order.)

$(60, 10)$
$(80, 8)$

$\frac{\Delta p}{\Delta q} = \frac{10-8}{60-80} = \frac{-2}{20} = -\frac{1}{10}$

$p = -\frac{1}{10}q + b$

$10 = -\frac{1}{10}(60) + b$

$10 = -6 + b$

$16 = b$

$\boxed{p = -\frac{1}{10}q + 16}$

b) Assuming that the supply function is linear, what is the supply equation for this situation? (Hint: Use the information about the wholesaler and write the information as ordered pairs. Here, (q,p) represents quantity and price, in that order.)

$(80, 10)$
$(100, 12)$

$\frac{\Delta p}{\Delta q} = \frac{12-10}{100-80} = \frac{2}{20} = \frac{1}{10}$

$p = \frac{1}{10}q + b$

$10 = \frac{1}{10}(80) + b$

$2 = b$

$\boxed{p = \frac{1}{10}q + 2}$

c) Based on the equations you found in parts (a) and (b), find the market equilibrium point

$10\left(\frac{1}{10}q + 2 = -\frac{1}{10}q + 16\right)$

$q + 20 = -q + 160$

$2q = 140$, $\boxed{q = 70 \text{ units}}$

$p = \frac{1}{10}(70) + 2$

$p = 7 + 2$

$\boxed{p = \$9}$