MAT 1311.01 - College Algebra, Summer3 2015 Test 2 Name: Key

Show your work or no credit will be given! 3pts ea

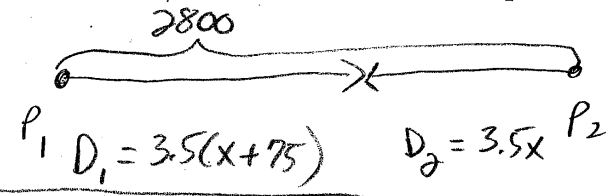
1. A widget is being sold in a store for $135.40 and has been marked up 7%. How much did the store pay for the widget?

$W + W(.07) = 135.40$

$1.07W = 135.40$

$W = \frac{135.40}{1.07} = \$126.54$

2. Two planes start out 2800 km apart and move towards each other meeting after 3.5 hours. One plane flies at 75 km/hour slower than the other plane. What was the speed of each plane?



$D_1 + D_2 = 2800$

$3.5(x+75) + 3.5x = 2800$

$3.5x + 262.5 + 3.5x = 2800$

$7x = 2537.5$

$x = 362.5$ kph

Slow Plane = 362.5 kph

Fast Plane = 437.5 kph

3. Solve this equation for the variable A: $A + B\left(C - \frac{D}{E}\right) = 100$

$A = 100 - B\left(C - \frac{D}{E}\right)$

4. Solve this equation for the variable B: $A + B\left(C - \frac{D}{E}\right) = 100$

$B\left(C - \frac{D}{E}\right) = 100 - A$

$B = \frac{100 - A}{C - \frac{D}{E}}$ or $\frac{E(100-A)}{EC - D}$

5. Solve this equation for the variable C: $A + B\left(C - \frac{D}{E}\right) = 100$

$BC - \frac{BD}{E} = 100 - A$

$BC = 100 - A + \frac{BD}{E}$

$C = \frac{1}{B}\left(100 - A + \frac{BD}{E}\right)$

or $C = \frac{100}{B} - \frac{A}{B} + \frac{D}{E}$

6. For each problem, use the rules of exponents to simplify as much as possible.
Use only positive exponents in your answer.

1pt ea

a) 0^4 → 0

b) 6^0 → 1

c) $(3^0)^4$ → 1

2 pts

d) $(4)^{-2}$ → $\frac{1}{16}$ $= \frac{1}{4^2}$

1pt

e) 0^0 → Dt. 71:29

2pts

f) x^3x^5 → x^8

2pts

g) $(x^3)^6$ → x^{18}

1pt

h) -5^2 → -25

3pts ea

i) $(x^2y^{-3}z^{-5})^{-6}$

$x^{-12}\ y^{18}\ z^{30}$

$\frac{y^{18}\ z^{30}}{x^{12}}$

j) $\left(\frac{x^5}{y^{-7}}\right)^{-3}$

x^{-15}

$\frac{x^{-15}}{y^{21}}$

$\frac{1}{x^{15}y^{21}}$

k) $(x^{-3}y^4z)^3 \cdot (2x^{-3}y^5z)^{-3}$

$x^{-9}\ y^{12}\ z^3 \cdot \frac{1}{8} x^9\ y^{-15}\ z^{-3}$

$y^{-3} \cdot \frac{1}{8}$

$\frac{1}{8y^3}$

7. Find the slope and y-intercept for each line by putting the line in its slope-intercept form:

3pts ea

a) $5x - 3y = 9$

$3y = 5x - 9$

$y = \frac{5}{3}x - 3$

slope = $\frac{5}{3}$

y-intercept = -3

b) $\frac{1}{2}y - 4x = 20$

slope = 8

y-intercept = 40

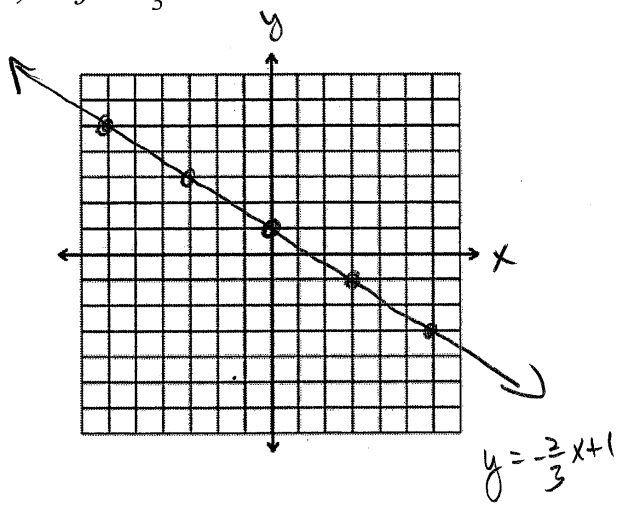
$\frac{1}{2}y = 4x + 20$

$y = 8x + 40$

3pts ea

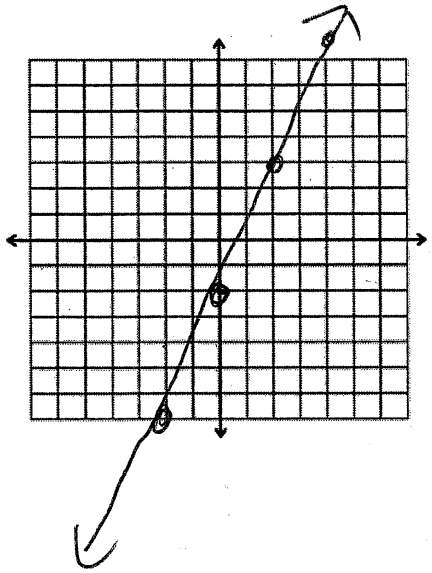
8. Graph each equation.

a) $y = \frac{-2}{3}x + 1$



$y = -\frac{2}{3}x + 1$

b) $y = \frac{5}{2}x - 2$



9. Find the following information for the given pair of points: (5 , -4) and (-6 , 9)

3pts a) The slope of the line connecting them

$$m = \frac{9-(-4)}{-6-5} = \frac{13}{-11} \text{ or } -\frac{13}{11}$$

3pts b) The equation of the line joining them written in point-slope form.

$$y+4 = \frac{-13}{11}(x-5)$$

3pts c) The equation of the line joining them written in slope-intercept form.

$$y = -\frac{13}{11}x + \frac{65}{11} - 4$$

$$y = -\frac{13}{11}x + \frac{21}{11}$$

10. In 1992, Americans bought an average of 120 meals per year at restaurants. This choice continued to grow in popularity and in the year 2012, the average reached 320 meals per year. **Show all work** and find the following:

3pts a) Write a linear equation **in slope-intercept form** that represents the relationship between the year and the average number of meals eaten in a restaurant each year. Let the x-coordinate represent the year.

$(1992, 120) + (2012, 320)$

$m = \frac{320-120}{2012-1992} = \frac{200}{20} = 10$

$y - 120 = 10(x - 1992)$

$y = 10x - 19800$

$(0, 120) + (20, 320)$

$m = \frac{320-120}{20-0} = 10$

$y = 10x + 120$

2pts ea b) How many meals were eaten at a restaurant in the year 2002?

$y = 10(2002) - 19800$

$y = 220$ meals

c) In what year will families eat an average of 600 meals per year?

$600 = 10x - 19800$

$20,400 = 10x$

$x = 2040$ when 600 meals per year will be consumed

4 pts ea

11. Solve each quadratic equation (Real Number solutions only. If your answer would be a Complex Number, just say "No Solution"). Show your work or no credit will be given!

a) $3x^2 - 8x = 0$

$X(3x-8)=0$

$X=0$ or $X=\frac{8}{3}$

b) $2x^2 + 5 = 45$

$2x^2 = 40$

$x^2 = 20$

$X = \pm\sqrt{20}$ or $\pm 2\sqrt{5}$ or ± 4.47

c) $9x^2 = 49$

$x^2 = \frac{49}{9}$

$X = \pm\frac{7}{3}$

d) $3x - 2x^2 = -14$

$2x^2 - 3x - 14 = 0$

$(2x-7)(x+2)=0$

$x = \frac{7}{2}$ or -2

e) $x^2 + 3x - 13 = 0$

$a=1, b=3, c=-13$

$$X = \frac{-3 \pm \sqrt{9-4(1)(-13)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{9+52}}{2}$$

$X = \frac{-3 \pm \sqrt{61}}{2} \approx -5.41$ or 2.41

f) $x^2 + 3x + 13 = 0$

$a=1, b=3, c=13$

$$X = \frac{-3 \pm \sqrt{9-4(1)(13)}}{2(1)}$$

$$= \frac{-3 \pm \sqrt{9-52}}{2}$$

$= \frac{-3 \pm \sqrt{-43}}{2} \in$ No Real Sol.

3 pts ea

12. For each parabola, tell whether it opens up or down and give the vertex.

a) $y = 2(x-3)^2 + 4$ Vertex: $(3, 4)$ Opens: up

b) $y = -3(x+4)^2 - 3$ Vertex: $(-4, -3)$ Opens: down

c) $y = -2x^2 + 12x - 7$ Vertex: $(3, 11)$ Opens: down

$\frac{-b}{2a} = \frac{-12}{2(-2)} = \frac{-12}{-4} = 3$

4pts

13. Draw an accurate sketch of the graph of the parabola using the techniques we used in class. You should clearly identify the vertex and use at least two good points and the symmetry of the parabola about its axis to sketch your graph.

$y = x^2 + 2x - 1$ $\frac{-b}{2a} = \frac{-2}{2(1)} = -1$

vertex = $(-1, -2)$

1 -2 -1

opens up

x	y
0	-1
1	2

$1 + 2 - 1 = 2$