

Math 1090-1 Test 3

Name: Key

ID# _____

To receive full credit you must show all of your work in a neat and organized manner. Write your answers and solutions in the space provided. Please box your answers. You may use a four-function calculator.

Math 1090-1 Test 3

1. (5 points) For a certain product, the revenue function is $R(x) = 60x$ and the cost function is $C(x) = 30x + 1800$. To obtain a profit, the revenue must be greater than the cost. For what values of x will there be a profit? Graph the solution.

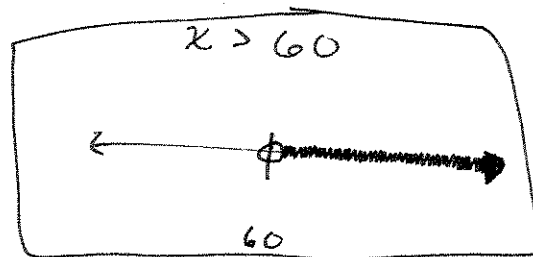
$$R(x) = 60x$$

$$C(x) = 30x + 1800$$

$$R(x) > C(x)$$

$$60x > 30x + 1800$$

$$30x > 1800$$



2. (15 points) A company manufactures backyard swing sets of two different sizes. The larger requires 5 hours of labor to complete, the smaller requires 2 hours, and there are 700 hours of labor available each week. The packaging department can pack at most 185 swing sets per week. If the profit is \$100 on each larger set and \$50 on each smaller set, how many of each should be produced to yield maximum profit? What is the maximum profit?

$$x = \text{Larger} : 5 \text{ hrs} \quad \$100$$

$$y = \text{Smaller} : 2 \text{ hrs} \quad \$50$$

$$\text{hrs} \leq 700$$

$$\text{package} \leq 185$$

$$\text{Max: } P = 100x + 50y$$

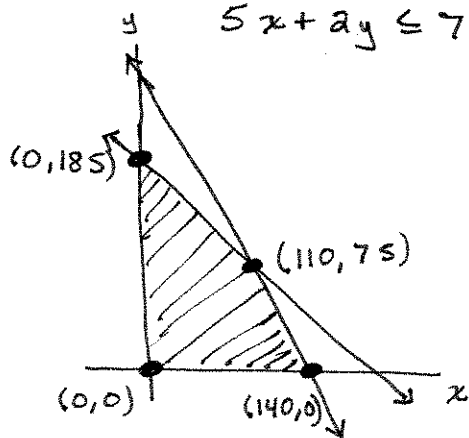
Constraints:

$$x \geq 0$$

$$y \geq 0$$

$$x + y \leq 185 \Rightarrow y \leq -x + 185$$

$$5x + 2y \leq 700 \Rightarrow y \leq -\frac{5}{2}x + 350$$



corners:

$$0 = -\frac{5}{2}x + 350$$

$$y = 0 + 185$$

$$\frac{5}{2}x = 350$$

$$x = 140$$

$$-x + 185 = -\frac{5}{2}x + 350$$

$$-\frac{3}{2}x = -165$$

$$x = 110$$

$$y = -110 + 185 = 75$$

$$\text{@ } (0,0) \quad P = 0$$

$$(0,185) \quad P = 9250$$

$$(110,75) \quad P = 14,750$$

$$(140,0) \quad P = 14,000$$

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\therefore Max profit when the company sells 110 Large, 75 small and

3. (15 points) Evaluate each logarithm given that

$$\log_a x = 2.5, \log_a y = 3.4, \log_a z = 7.1$$

(a) $\log_a(yz)$

$$= \log_a y + \log_a z$$

$$= 3.4 + 7.1$$

$$= 10.5$$

(b) $\log_a(z^6)$

$$= 6 \log_a z$$

$$= 6(7.1)$$

$$= 42.6$$

(c) $\log_a\left(\frac{x}{y}\right)$

$$= \log_a x - \log_a y$$

$$= 2.5 - 3.4$$

$$= -0.9$$

4. (5 points) The demand function for a product is given by $p = 200e^{-0.02q}$. What is the revenue when the price is \$30, if the same number of units is demanded and supplied?

$$\text{Revenue} = (\text{price}) (\# \text{ items sold}) = 30q$$

demand is given by $p = 200e^{-0.02q}$ so

when $p = 30$ we can solve for q :

$$30 = 200e^{-0.02q}$$

$$\frac{3}{20} = e^{-0.02q}$$

$$\ln \frac{3}{20} = -0.02q$$

$$q = \frac{-1}{0.02} \ln \left(\frac{3}{20} \right)$$

$$\therefore R = 30 \left(\frac{-1}{0.02} \ln \left(\frac{3}{20} \right) \right)$$

