MA 110 TEST 2 REVIEW WORKSHEET

Name Solutions

1. ***** DO NOT SOLVE – JUST SET-UP THIS PROBLEM *****
South Shore Sail Loft manufactures regular and competition sails. Each regular sail takes 2 hours to cut and 4 hours to sew. Each competition sail takes 3 hours to cut and 10 hours to sew. There are 150 hours available in the cutting department and 380 hours available in the sewing department. If the Loft makes a profit of $100 on each regular sail and $200 on each competition sail, how many sails of each type should the company manufacture to maximize their profit?

A. Define the variables for this problem.

x = # of regular sails

y = # of competition sails

B. Make a table summarizing all of the data.

	Regular	Competition	Available
Cutting	2	3	150
Sewing	4	10	380
Profit	100	200	

C. Write an expression in X and Y for the objective function.

Profit = 100 x + 200y

D. Write the system of **all inequalities** that must be satisfied to solve this problem.

$2x + 3y \leq 150$
$4x + 10y \leq 380$
$x \geq 0$
$y \geq 0$

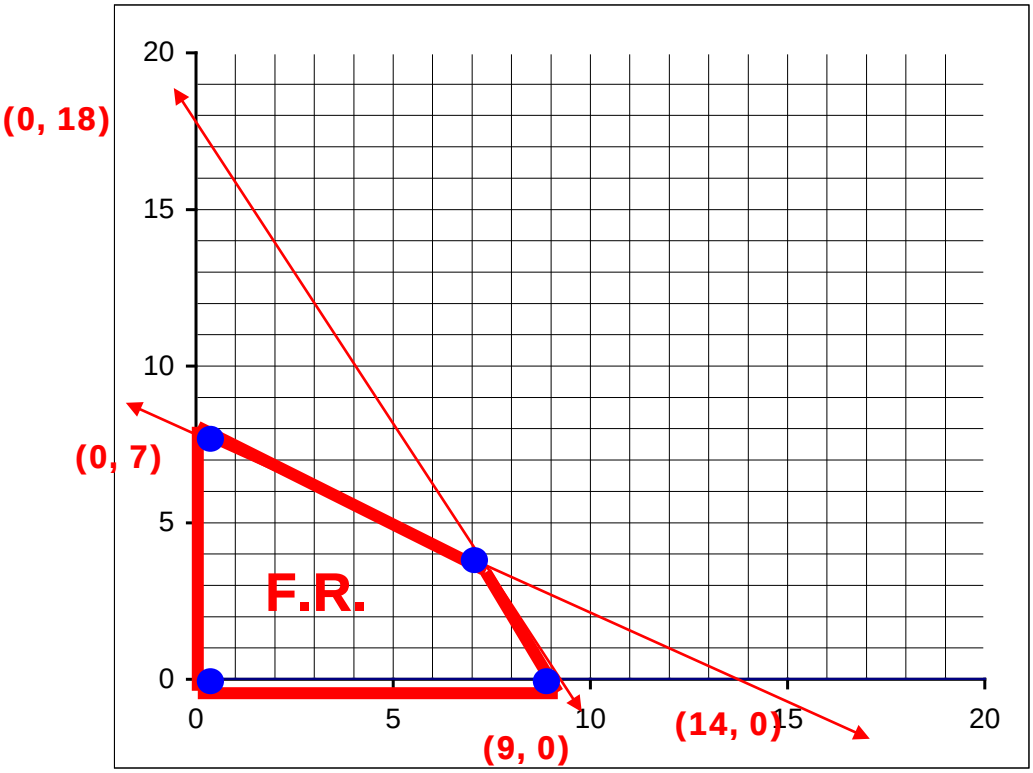
DO NOT DO ANYTHING ELSE WITH THIS PROBLEM!!

2. Graph & **LABEL** the feasible region for the following system of equations:

$$\begin{aligned} 2x + y &\le 18 \\ 2x + 4y &\le 28 \\ x &\ge 0 \\ y &\ge 0 \end{aligned}$$

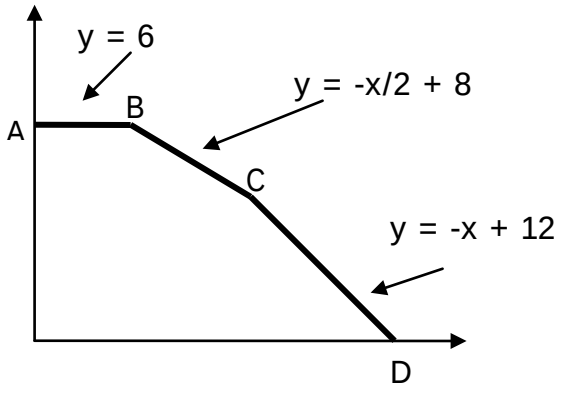
Be sure to include **ALL** of the following:

A. Find the x and y-intercepts of the 1st two inequalities.
B. Clearly shade the inequalities.
C. Darken the boundary lines of the feasible region.
D. Draw a big dark dot on the corner points of the feasible region.
E. Write the label "F R" in the feasible region.
F. State whether the feasible region is bounded or unbounded.



The feasible region is bounded.

3. Find the coordinates of the corner points (A, B, C, & D) for the following feasible region. You must label your answers and write them as ordered pairs.



A = (0,6) B = (4,6)

6 = -x/2 + 8
-2 = -x/2
x = 4

C = (8,4) D = (12,0)

-x/2 + 8 = -x = 12 ➔ x/2 = 4 ➔ x = 8
Y = -x + 12 ➔ y = -8 + 12 = 4

4. A. Which of the following points minimizes the objective W = 4x + 5y? V

	W = 4x + 5y
R: (0, 12)	4(0) + 5(12) = 60
S: (4, 8)	4(4) + 5(8) = 56
T: (6, 6)	4(6) + 5(6) = 54
V: (8, 0)	4(8) + 5(0) = 32

B. What is the minimum value of W? 32

5. Given Universe = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15};

A = {3, 5, 15}; B = {2, 4, 6, 8, 10, 12, 14}; C = {1, 2, 3, 4, 5}.

Find:

A. B'

{1, 3, 5, 7, , 9, 11, 13, 15}

B. A ∩ C

{3, 5}

C. A ∪ C

{1, 2, 3, 4, 5, 15}

D. A' ∩ B

A' = { 1, 2, 4, 6, 7, 8, 9, 11, 12, 13, 14}

A' ∩ B = {2, 4, 6, 8, 10, 12, 14}

6. Use the permutation or combination counting formula to answer the following:

   A. Fifty kids are running a race. How many different outcomes are possible for the 1^{st}, 2^{nd}, 3^{rd}, and 4^{th} place finishers?

   $P_{50,4} = 5{,}527{,}200$

   B. How many ways can a person choose 4 of their 25 books to donate to a book drive?

   $C_{25,4} = 12{,}650$

   C. Your new suitcase only holds five outfits. If you have forty outfits, how many ways could you select five outfits to pack in your suitcase?

   $C_{40,5} = 658{,}008$

7. At your new job, your boss tells you to make up security codes using two letters followed by three digits. (Note: There are 26 letters and 10 digits in our system.)

   A. How many different codes can you make if you can't repeat the letters or the digits?

   $26 \bullet 25 \bullet 10 \bullet 9 \bullet 8 = 468{,}000$

   B. How many different codes can you make if can repeat the letters but not the digits?

   $26 \bullet 26 \bullet 10 \bullet 9 \bullet 8 = 486{,}720$

   C. How many different codes can you make if can repeat the digits but not the letters?

   $26 \bullet 25 \bullet 10 \bullet 10 \bullet 10 = 650{,}000$

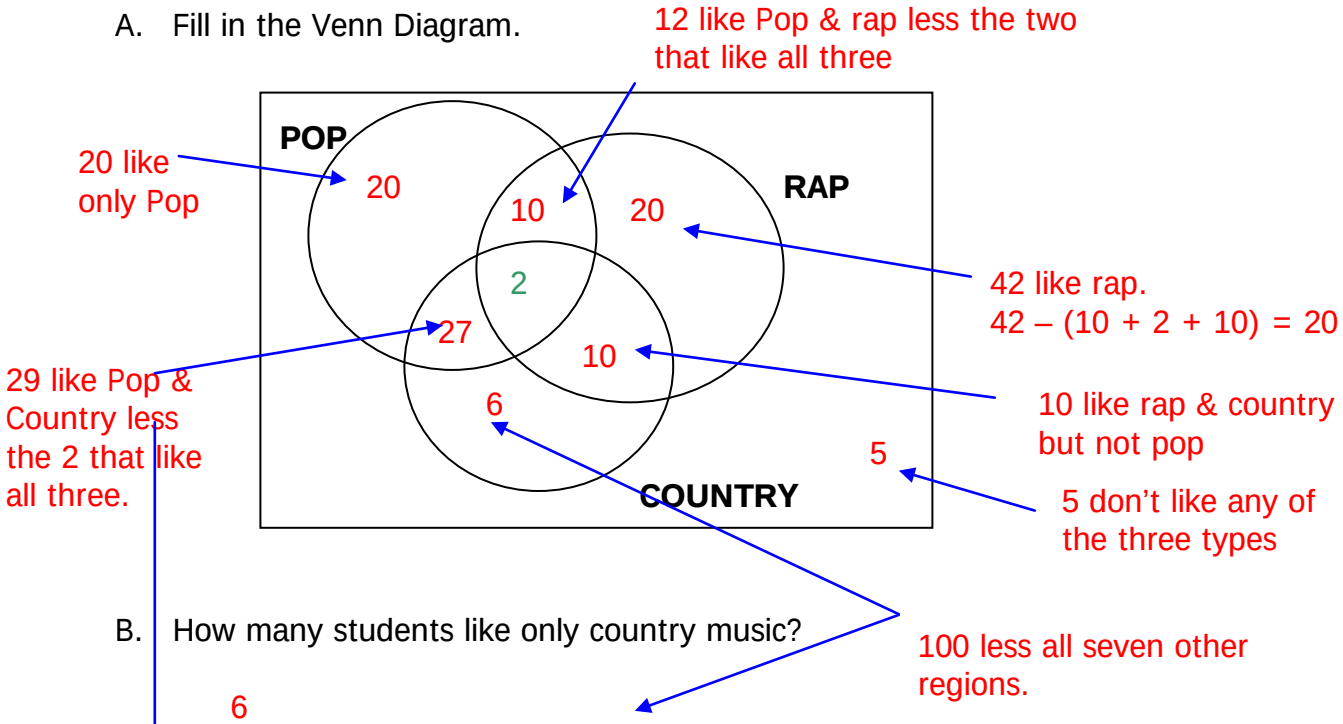
   D. How many different codes can you make if can repeat the letters and the digits?

   $26 \bullet 26 \bullet 10 \bullet 10 \bullet 10 = 676{,}000$

8. One hundred students were asked if they liked listening to pop, rap, or country music. Forty two students like rap music. Twelve students liked pop and rap music. Only two students liked all three kinds of music. Twenty-nine students said they liked pop and country music. Twenty students like only pop music. Ten students like rap and country, but not pop music.

   Five students said they did not like any of the three types of music.

   A. Fill in the Venn Diagram.



   B. How many students like only country music?

      6

   C. How many students like pop and country, but not rap music?

      27

   D. How many students like country music?

      27 + 2 + 10 + 6 = 45

   E. How many students like at least one kind of music?

      95 (100 – outer 5)

   F. How many students are interested in only one kind of music?

      20 + 20 + 6 = 46