1. Graph $2x - y \leq 50, \ -3x + y \leq 30$.

2. Does $C = 5x + 8y$ have either a maximum or a minimum on the region bordered by $y \geq 2, \ x \geq 0, \ 6x + 7y \geq 74, \ 8x + 3y \geq 48$? If not, why not and if so, find it.

3. Solve the linear programming problem. An Amish company makes handmade sweaters and blankets. Each must be spun, dyed and woven. Each sweater takes 1 hour for spinning, 1 hour for dyeing and 1 hour for weaving. Each blanket takes 2 hours for spinning, 1 hour for dyeing and 4 hours for weaving. They can use up to 8 hours for spinning, 6 hours for dyeing and 14 hours for weaving. Profit is $20 per sweater and $30 per blanket. How many sweaters and how many blankets should they make to maximize their profit. Are there any leftover hours and if so, for what and how much?

4. The universal set is the people in College Station.

   T is all those in C.S who got a traffic ticket within a year.

   A is all those in C.S. who had a traffic accident within a year.

   S is all those in C.S. who have gone over the speed limit within a year.

   Describe each set in words and shade it in a Venn diagram.

   a) $S \cap (A \cup T)^c$

   b) $(S \cap A) \cup T$

   c) $(S \cup A)^c \cap T$

   Also be able to describe a set given in a Venn diagram in words or in symbols.

5. A company is studying the effectiveness of its advertising. 45 people who use the product were asked if they read the newspaper ad or watched the TV ad. Eight said they had done neither. A total of 20 people read the newspaper ad and a total of 32 people watched the TV ad. How many did both?
6. 70 children were asked if they own a cat, a dog or a guinea pig.

5 said they own none of these.
30 own a cat.
9 own a cat and a dog, but do not own a guinea pig.
2 own all three.
6 own a cat and a guinea pig.

25 own a cat or a guinea pig, but do not own a dog.
20 own only a dog.

a) Fill in a Venn diagram with the number in each region (all 8 regions).
b) How many own at least one of the three?
d) How many own a guinea pig?

7. Six friends sign up for a course which has 10 sections.

a) How many ways can they be assigned to sections?
b) How many ways can they all get different sections?
c) How many ways can at least two get the same section?

8. How many 5-long codes can be made from the first 12 letters of the English alphabet if letters which are next to each other cannot be the same?
9. Four companies each send representatives to a convention. There are 4 from Honda, 3 from Toyota, 5 from Ford and 6 from Chrysler.

   a) How many ways can they line up for a photo?

   b) How many ways can they line up for a photo if representatives of the same company must be kept together?

10. How many distinguishable arrangements are there of 18 new cars consisting of 4 silver Honda civic, 3 black Toyota Corolla, 5 red Ford escort, and 6 white Chrysler minivans?

11. Give a sample space for each experiment that is suitable for a uniform probability space.

   a) Toss a fair coin 3 times and observe the number of heads.

   b) Select 3 distinct letters from a set of 5 distinct letters.

   c) Toss a fair coin 3 times and observe the number of heads and select 4 letters all at once from a set of 6 letters.

12. A crate contains 15 oranges, 20 grapples and 10 pears. Seven are randomly chosen without replacement. How many outcomes correspond to the even that:

   a) At least one orange is chosen?

   b) 3 grapples and 4 pears are chosen?