1. A chef is making chocolate bars, white and dark. It takes him 6 minutes to make a white chocolate bar and 3 minutes to make a dark chocolate bar. Each white chocolate bar uses 3/4 cup of chocolate chips and each dark chocolate bar uses one cup of chocolate chips. He has 20 hours available for making the chocolate bars and has 250 cups of chocolate chips on hand. He makes a profit of $2 on each white chocolate bar and $1.50 on each dark chocolate bar. How many white and how many dark chocolate bars should he make in order to maximize his profit?

2. The Corner Coffee Shop is selling two blends of beans: House Blend and Anniversary Blend. House Blend is one-half Mexican beans and one-half Colombian beans. Anniversary Blend is one-quarter Mexican beans and three-quarters Colombian beans. Profit on the House Blend is $3.50 per pound, while profit on the Anniversary Blend is $4.00 per pound. Each day the Corner Coffee Shop receives a shipment of 200 pounds of Mexican beans and 330 pounds of Colombian beans to use for the two blends. How many pounds of each blend should be prepared each day to maximize profit? What is the maximum profit?

3. A glass dinnerware factory produces glasses and bowls, at its two plants, Plant A and Plant B. Plant A produces 300 glasses and 200 bowls each day at a cost of $1000, while Plant B produces 100 glasses and 600 bowls each day at a cost of $1500. Shannon has an order from a local Supermarket for at least 30,000 glasses and 60,000 bowls. How should Shannon schedule the production so that it can fill the order at minimum cost? What is the minimum cost?

4. Let A and B be sets in the universal set U. If \( n(A) = 24 \) and \( n(B) = 12 \), and \( n(A \cup B) = 32 \), find
   a. \( n(A \cap B) \)
   b. \( n(U) \) if \( n(A^c \cap B^c) = 6 \)
   c. \( n(A^c) \)

5. What set is represented by the shaded region in the Venn diagram below (to be drawn in class)?

6. Of 100 college students, 40 plan to take Mathematics, 60 plan to take Biology, 50 plan to take Chemistry, 25 plan to take Mathematics and Biology, 20 plan to take Mathematics and Chemistry, 22 plan to take Biology and Chemistry, and 10 plan to take all three of these subjects.
   a. How many students plan to take Mathematics but neither of the other two subjects?
   b. How many students plan to take Chemistry but not Biology?
   c. How many are taking none of the three subjects?

7. A student has to take one course in physics, three in literature and two in mathematics, or two courses in physics, two in literature and one in mathematics. He may choose among 5 physics courses, 9 literature courses and 8 mathematics courses. In how many ways can this student select the courses he has to take?

8. In how many different ways can 12 teachers and 2 substitute teachers be chosen from a pool of 23 candidates?

9. Five cards are dealt from a standard 52 deck. In how many ways can two of the cards be diamonds or three be hearts?
10. Find the number of different arrangements of each of the following words.

   a. teamworks

   b. tralaalaa

   c. lalaalaaa

11. A box contains fortune cookies, with messages as follows: 11 Good Luck, 7 Best Wishes, and 8 Encouragement. A sample of 11 fortune cookies is to be picked from the box. How many samples contain

   a. At least one Good Luck message?

   b. Exactly 4 Good Luck messages and exactly 3 Encouragement messages?

   c. Exactly 5 Best Wishes messages or exactly 3 Encouragement messages?

   d. How many samples contain exactly 7 Good Luck cookies or exactly 6 best Wishes cookies?