*CS330 Homework 5, due Mon Mar 6**   *version 7:09 PM, 2017-02-26*

Questions

1. Points = 2: There are 4 major auto routes from Boston to Detroit and 6 from Detroit to Los Angeles. How many major auto routes are there from Boston to Los Angeles via Detroit?

2. Points = 3: How many positive integers between 5 and 31
    a. Are divisible by 3? List them.   b. Are divisible by 4? List them.   c. Are divisible by 3 and by 4? List them.

3. Points = 3: How many strings of 4 decimal digits
    a. Do not contain the same digit twice?   b. End with an even digit?   c. Have exactly 3 digits that are 9s?

4. Points = 6: In how many ways can a photographer at a wedding arrange 6 people in a row from a group of 10 people, where the bride and the groom are among these 10 people, if
    a. The bride must be in the picture?
    b. Both the bride and groom must be in the picture?
    c. Exactly one of the bride and the groom is in the picture?

5. Points = 2: A bowl contains 10 red balls and 10 blue balls. A woman selects balls at random (without replacement) without looking at them.
    a. How many balls must she select to be sure of having at least 3 balls of the same color?
    b. How many balls must she select to be sure of having at least 3 blue balls?

6. Points = 2: Suppose that there are 9 students in a discrete mathematics class at a small college.
    a. Show that the class must have at least 5 male students or at least 5 female students.
    b. Show that the class must have at least 3 male students or at least 7 female students.

7. Points = 2: A computer network has 6 computers with computer directly connected to at least 1 of the others. Show that there are at least 2 computers in the network that are directly connected to the same number of other computers.

8. Points = 2: Let S = {1, 2, 3, 4, 5}.
    a. How many 3-combinations of S are there? List them.
    b. How many 3-permutations of S are there? Show how to use your answer from part (a) to get all the permutations (you don't have to actually list all of them individually).

9. Points = 2: There are 6 different candidates for governor of a state. In how many different orders can the names of the candidates be printed on a ballot?

10. Points = 4: How many bit strings of length 12 contain
    a. Exactly three 1s?
    b. At most three 1s?
    c. At least three 1s?
    d. An equal number of 0s and 1s?

11. Points = 4: A coin is flipped 8 times where each flip comes up either heads or tails. How many possible outcomes
    a. Are there in total?
    b. Contain exactly 3 heads?
    c. Contain at least 3 heads?
    d. Contain the same number of heads and tails?

12. Points = 4: How many ways are there for 10 women and 6 men to stand in a line so that no 2 men stand next to each other?

13. Points = 4: Suppose that a department contains 10 men and 15 women. How many ways are there to form a committee with 6 members if it must have more women than men?.

_____