MATH 112 - Discrete Mathematics
Exercise Set 1

1. In how many ways can the letters in VISITING be arranged? How many arrangements have all three I's together? In how many ways can letters in WONDERING be arranged with exactly two consecutive vowels?

2. If we write all integers form 1 to 1 million, how many times would we write digit 9?

3. In how many ways can twelve people be arranged about a circular table if
   (a) there is no restriction?
   (b) if two people insist on sitting next to each other?
   (c) there are 9 men and 3 women and no two women sit next to each other?

4. (a) In how many ways can two squares be selected from the 8×8 chessboard so that they are not in the same row or column? What if you want to select four squares, two of which are not in the same row or column?
   (b) Find the number of different paths for a rook (a rook can move horizontally and vertically) to move from the southwest corner to the northeast corner by moving eastward and northward only.

5. In how many ways can $2n$ people be divided into n pairs?

6. In a class of 100 students (40 boys and 60 girls), how many different arrangements are there to form a comittee of 12 if
   (a) there is no restriction?
   (b) there must be equal number of boys and girls?
   (c) there must be 9 boys and 3 girls?

7. In how many ways can a gambler draw five cards from a standard deck and get
   (a) a flush (five cards of the same suit)?
   (b) four of a kind?
   (c) three of a kind?
   (d) a full house (three of a kind and a pair)?
   (e) two pairs?

8. Find the coefficient of xy^2z^3 in the expansion of
   (a) $(x + y + z + 1)^{10}$,
   (b) $(2x - y + 3z + w - 2)^{12}$,
   (c) $(v + x - 3y^2 - 2z + 5w + 3)^{12}$.