Probability Homework #3
(Coverage: 2.4, 3.1,3.2,3.3)

1. In a closet there are 10 pairs of shoes. If six shoes are selected at random, what is the probability of (a) no complete pairs; (b) exactly one complete pair?.

2. What is the coefficient of $x^2y^3z^2$ in the expansion of $(2x - y + 3z)^7$?

3. A team consisting of three boys and four girls must be formed from a group of nine boys and eight girls. If two of the girls are feuding and refuse to play on the same team, how many possibilities do we have?

4. A fair die is tossed six times. What is the probability of getting exactly two 6's?

5. By a combinatorial argument, prove that for $r \leq n$ and $r \leq m$,
$$\binom{n+m}{r} = \binom{m}{0}\binom{n}{r} + \binom{m}{1}\binom{n}{r-1} + \cdots + \binom{m}{r}\binom{n}{0}$$

6. There are 12 balls in a box. Among these balls, two balls are yellow. Someone withdrew 7 balls randomly from the box. What is the probability that the remaining 5 balls contains at least 1 yellow ball?

7. If eight defective and 12 nondefective items are inspected one by one, at random and without replacement, what is the probability that (a) the first four items inspected are defective; (b) from the first three items at least two are defective?

8. From an ordinary deck of 52 cards, cards are drawn one by one, at random and without replacement. What is the probability that the fourth heart is drawn on the tenth draw? *Hint: Let F denote the event that in the first nine draws there are exactly three hearts, and E be the event that the tenth draw is a heart. Use P(FE) =P(F)P(E | F)*

9. Suppose that 40% of the students of a campus are men. If 20% of the men and 16% of the women of this campus own driver licenses, what percent of all of them own driver licenses?

10. One of the cards of an ordinary deck of 52 cards is lost. What is the probability that a random card drawn from this deck is a spade?

11. A box contains 18 tennis balls, of which eight are new. Suppose that three balls are selected randomly, played with, and after play are returned to the box. If another three balls are selected for play a second time, what is the probability that they are all new?