

**HW 2-2 (Due Sep. 6, 2016)**

**Name:**

Print then work on it directly. Staple HW 2-1, 2-2, 2-3 together.

**Problem 1**

- 2.43** A fleet of nine taxis is to be dispatched to three airports in such a way that three go to airport A, five go to airport B, and one goes to airport C. In how many distinct ways can this be accomplished?
- 2.44** Refer to Exercise 2.43. Assume that taxis are allocated to airports at random.
- a** If exactly one of the taxis is in need of repair, what is the probability that it is dispatched to airport C?
  - b** If exactly three of the taxis are in need of repair, what is the probability that every airport receives one of the taxis requiring repairs?

**Problem 2**

- 2.46** Ten teams are playing in a basketball tournament. In the first round, the teams are randomly assigned to games 1, 2, 3, 4 and 5. In how many ways can the teams be assigned to the games?

**Problem 3**

**2.45** Suppose that we wish to expand  $(x + y + z)^{17}$ . What is the coefficient of  $x^2y^5z^{10}$ ?

**2.48** If we wish to expand  $(x + y)^8$ , what is the coefficient of  $x^5y^3$ ? What is the coefficient of  $x^3y^5$ ?

**Problem 4**

- 2.59** Five cards are dealt from a standard 52-card deck. What is the probability that we draw
- a** 1 ace, 1 two, 1 three, 1 four, and 1 five (this is one way to get a “straight”)?
  - b** any straight?

**Problem 5**

**2.68** Show that, for any integer  $n \geq 1$ ,

**a**  $\binom{n}{n} = 1$ . Interpret this result.

**b**  $\binom{n}{0} = 1$ . Interpret this result.

**c**  $\binom{n}{r} = \binom{n}{n-r}$ . Interpret this result.

**d**  $\sum_{i=0}^n \binom{n}{i} = 2^n$ . [*Hint*: Consider the binomial expansion of  $(x + y)^n$  with  $x = y = 1$ .]

**2.69** Prove that  $\binom{n+1}{k} = \binom{n}{k} + \binom{n}{k-1}$ .

**Problem 6**

**2.75** Cards are dealt, one at a time, from a standard 52-card deck.

- a** If the first 2 cards are both spades, what is the probability that the next 3 cards are also spades?
- b** If the first 3 cards are all spades, what is the probability that the next 2 cards are also spades?
- c** If the first 4 cards are all spades, what is the probability that the next card is also a spade?