Math 102
Exam 3: Additional Practice Problems

1. Compute the value of each of the following:

   (a) 0!

   (b) 5!

   (c) $\frac{10!}{7!}$

   (c) $C(10,7)$

2. A local restaurant has 4 appetizers, 12 entrees, and 5 desserts. Find the number of possible meals that can be formed by choosing exactly one menu item of each type.

3. A company assigns billing codes to each of its clients consisting of two letters followed by three one-digit numbers. Find the number of possible billing codes if:

   (a) Repetition is allowed.

   (b) Repetition is **not** allowed.

4. A club has 5 male members and 7 female members.

   (a) How many ways can a committee of 5 club members be chosen?

   (b) How many ways can a committee of 5 be chosen if the committee is required to consist of 2 men and 3 women?

   (c) How many ways can a committee of 5 be chosen if one member is designated as the head of the committee, and the rest of the committee is required to consist of 2 men and 2 women?

5. Suppose you go to the store and purchase a variety pack with 8 individually wrapped bags of chips, where each bag is of a different type. You plan to select one bag each day (Monday through Friday) to include as part of the lunch you take to work. How many different ways could the chips you bring to work for lunch that week be selected?

6. A bag contains 7 white chips, 3 red chips, and 2 blue chips.

   (a) Suppose 1 chip is randomly drawn from the bag.

      i. Find the probability that a blue chip is drawn.

      ii. Find the *odds* in favor of drawing a white chip.

   (b) Now suppose that all of the 12 original chips have been returned to the bag, and then two chips are randomly drawn from the bag, one at a time, without replacement.

      i. Find the probability that both chips are red.

      ii. Find the probability that the first chip is white and the second chip is blue.

      iii. Find the probability that neither chip is red.

      iv. Find the probability that **at least one** chip is blue.

7. A survey of 50 college students finds that 25 of them are taking Math this semester, 20 are taking English, and 10 are taking both Math and English. Suppose that a student is randomly selected from among the students who participated in the survey.

  (a) Find the probability that the student is taking Math but is not taking English.
  (b) Find the probability that the student is taking either Math or English.
  (c) Find the probability that the student is taking neither Math nor English.
  (d) Given the the student is taking Math, find the probability that the student is also taking English.
  (e) Are taking Math and Taking English independent?

8. Consider the following game: A bag contains 10 red balls and 5 green balls. There are two ways to play -

  Option 1: Pay \$1 for the opportunity to draw one ball out of the bag. If you draw a red ball, you lose your \$1. If draw a green ball, you win \$3 (your original \$1, plus \$2 more).

  Option 2: Pay \$5 for the opportunity to draw two balls (without replacement) out of the bag. If the two balls you draw are different colors, you lose your \$5. If the two balls are the same color, you win \$10 (your original \$5, plus \$5 more).

  (a) Find the expected value for playing Option 1 of this game. Is this game fair?
  (b) Find the expected value for playing Option 2 of this game. Is this game fair?

9. For a standard deck of 52 cards, find the probability of drawing 5 cards without replacement and getting a full house (three of a kind plus a pair).

10. Suppose you are going to take a multiple choice test which has 6 questions, with each question having 4 options to choose from. Since you did not have time to study, you decide to answer by randomly guessing each answer.

  (a) Find the number of different ways one could complete this exam.
  (b) Find the probability of getting all 6 questions right by randomly guessing.
  (c) Find the probability of getting **exactly** 5 questions right.