Math 102
Exam 3: Additional Practice Problems

1. Let $U = \{\ x\ |\ x$ is a whole number less than 12 $\}$; $A = \{0, 2, 4, 6, 8\}$; $B = \{1, 2, 3, 4, 5\}$; $C = \{6, 7, 8, 9, 10\}$
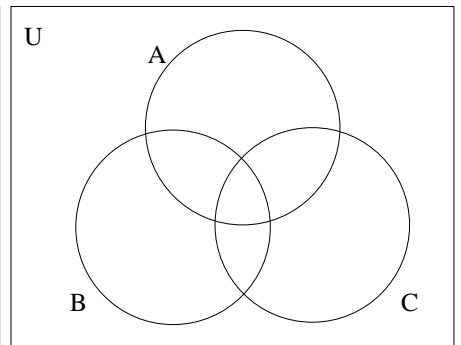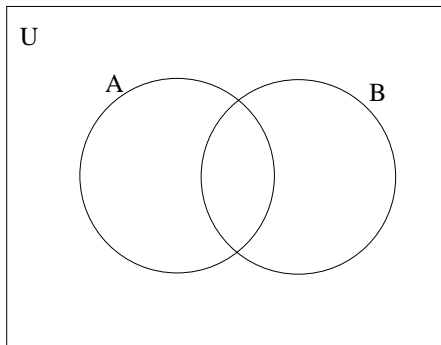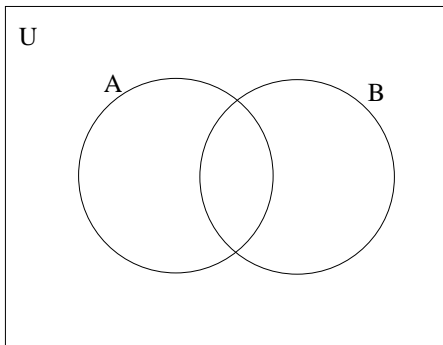
   (a) Write U in roster form

   (b) $A \cap B =$

   (c) $A \cup C =$

   (d) $A' =$

   (e) $B \cap C =$

   (f) $B - A =$

   (g) $n(A \cap C) =$

   (h) $n(C' \cap B) =$

2. Illustrate the following by shading the appropriate regions of the given Venn diagrams:
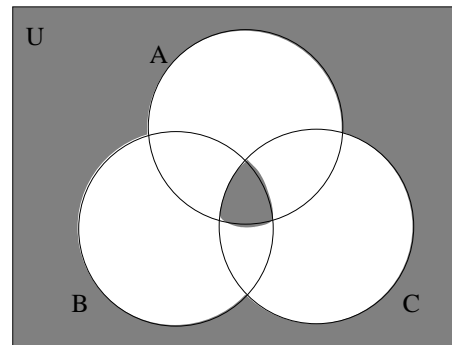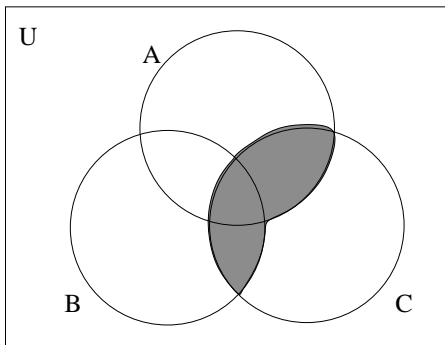
   (a) $(A - B) \cup (B - A)$

   (b) $A - B'$

   (c) $A \cup (B \cap C)$

3. Use set notation to describe the shaded regions in each Venn diagram given below:

   (a)

   (b)

4. A survey of 100 college students asked about the websites they visited that week among the 3 choices: Facebook, Myspace, and YouTube. Suppose the survey found that 70 visited Facebook, 35 visited YouTube and Facebook, 20 visited all three, 50 visited both Myspace and Facebook, 40 visited Myspace but not YouTube, 85 visited Facebook or Myspace, and 10 visited none of them.
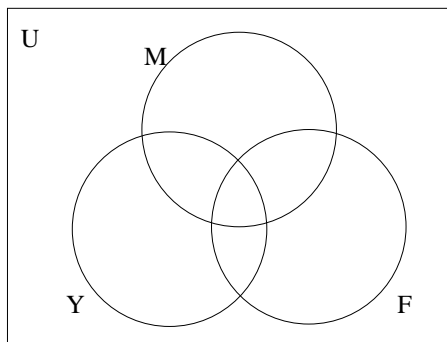
   (a) How many visited Myspace but not Facebook?

   (b) How many visited Myspace and YouTube?

   (c) How many visited Facebook or YouTube?

   (d) How many visited Myspace?

   (e) How many visited only YouTube?

5. 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. Are the outcomes of this experiment equally likely? Justify your answer.

        ii. Find $n(S)$

        iii. Find the probability that both chips are red.

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

        v. Find the probability that neither chip is red.

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

6. 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?

7. 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?

8. 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).

9. 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.