Math 102
Exam 1: Additional Practice Problems

1. List the 7 problem solving strategies from section 1.1 in your book.

2. Determine whether each statement below is true or false.
   If it is true, explain how you know that it is true, and if it is false, give an example that shows it must be false.

   (a) $\dfrac{a+b}{a+c} = \dfrac{b}{c}$

   (b) 150 is an overestimate of 13.21×9.17

   (c) $ 9,994.99 rounded to the nearest dollar is greater than $ 9,994.99 rounded to the nearest 10 dollars.

   (d) If $A \cap B = \emptyset$, then A is empty or B is empty.

   (e) If A and B are equal as sets, then A and B are also equivalent as sets.

3. Suppose you and a friend go out to dinner at a nice restaurant, and your bill for the meal is $37.43. Give both an over-estimate and an under-estimate for a 15% tip for your server based on the amount of your total bill.

4. (a) Use set notation to list all the elements of the set:
       $A = \{\, x \mid x \text{ is an odd whole number less than 21} \,\}$

   (b) Use set-builder notation to describe the set $\{-3, -2, -1, 0, 1, 2, 3\}$

5. Given that $A = \{\, x \mid x \text{ is a letter in the word } banana \,\}$, $B = \{\, x \mid x \text{ is a letter in the word } bandanna \,\}$,
   $C = \{\, x \mid x \text{ is a letter in the word } band \,\}$, and $D = \{\, \emptyset \,\}$, indicate whether the following are True or False
   (you do NOT need to justify your answers)

   (a) $\{a\} \in A$ (e) $B \subset C$

   (b) $d \in A$ (f) $B = C$

   (c) $\emptyset \subseteq A$ (g) $D \subset B$

   (d) $A \subseteq B$ (h) $\emptyset \in D$

6. Let $U = \{\, x \mid x \text{ is a whole number less than 12} \,\}$; $A = \{0, 2, 4, 6, 8\}$; $B = \{1, 2, 3, 4, 5\}$; $C = \{6, 7, 8, 9, 10\}$

   (a) Write U in roster form   (e) $B \cap C =$

   (b) $A \cap B =$ (f) $B - A =$

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

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

7. (a) List all the subsets of the set $\{a, b, c\}$
   (b) How many subsets does the set $\{a, b, c, d, e\}$ have?
   (c) Write out the first 6 rows of Pascal's Triangle
   (d) Use Pascal's Triangle to find the number of 3 element subsets of $\{a, b, c, d, e\}$

8. Illustrate the following by shading the appropriate regions of the given Venn diagrams:
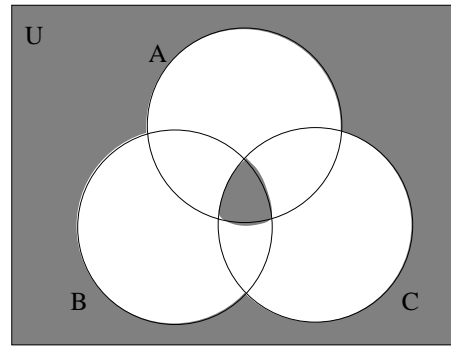
   (a) $(A - B) \cup (B - A)$ (b) $A - B'$ (c)$A \cup (B \cap C)$
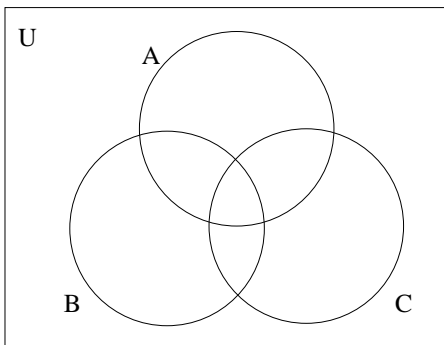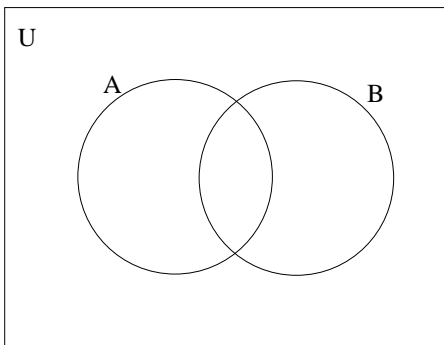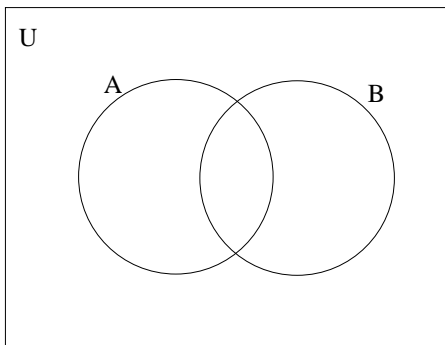
9. Use set notation to describe the shaded regions in each Venn diagram given below:
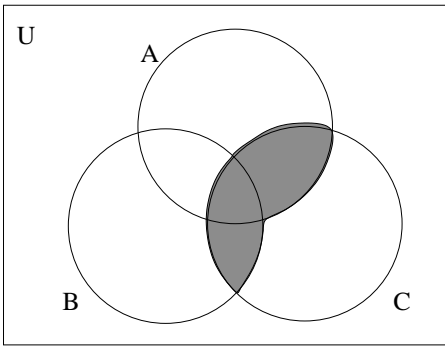

(a)

(b)

10. 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.
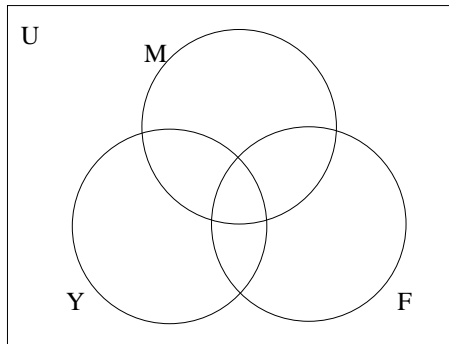
(a) How many visited Myspace but not Facebook?

(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?

11. For each of the following, state whether the situation is an example of inductive or deductive reasoning:

(a) You notice that your houseplants seem to grow better if you water them in the morning rather than in the evening, so you decide to start watering them every morning right before you leave to go to school.

(b) After hearing a debate on the radio, you decide to construct a truth table in order to determine whether or not the logical argument given by one of the participants is valid.

(c) The last couple of times you have gone to the grocery store on Friday afternoon, you noticed that they were giving away free samples, so you decide to start doing your grocery shopping on Friday afternoon every week.

12. Use inductive reasoning to predict the next two terms in each of the following sequences:

(a) $\dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}, \dfrac{4}{5}...$ (b) $1, 2, 4, 7, 11, 16, ...$ (c) $2, 5, 7, 12, 19, 31, ...$

13. Determine whether or not each of the following are statements:

(a) I went to the store last night.

(b) Did you remember to get milk at the store?

(c) I forgot to pick up a gallon of milk at the store.

14. Negate each of the following statements, then rewrite them as English sentences:

(a) All bees are busy.

(b) Some things are better left unsaid.

(c) I got up early on Saturday and went to the gym.

15. Given p : "I studied for this exam", q : "I got a good grade on this exam", r : "I understand truth tables", and s : "I am not good at doing proofs", translate the following statements into words:

(a) $p \wedge (\sim s) \rightarrow q$

(b) $(\sim p \vee s) \rightarrow \sim q$