HW 1

For question 5 refer to your textbook. Recall that the textbook uses the algebraic format for unions and intersections, i.e. $(A \cup B) => (A+B)$, and $(A \cap B) => (AB)$. You can use any format for this homework.

1) State every possible subset of the set $\{a,b,c,d\}$.

2) Use Venn diagrams to prove De Morgan's Laws.

3) A universal set is given as $S = \{2, 4, 6, 8, 10, 12\}$. Define two sets, $A = \{2, 4, 10\}$, and $B = \{4, 6, 8, 10\}$. Determine the following:

   a. S - A
   b. B - A
   c. $A \cup B$
   d. $A \cap B$
   e. $A' \cap B$ (A' is the complement of A, i.e. A^c)

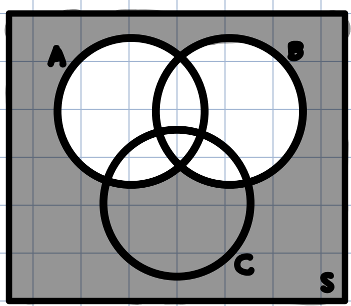
4) In a box of 400 colored balls, 75 are black, 50 are green, 175 are red, 70 are white, and 30 are blue. What are the probabilities of selecting a ball of each color.

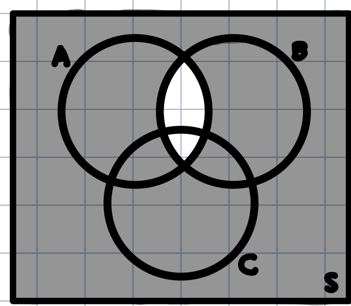
5) Problem 2.2.

VIGOMAR KIM ALGADOR
ENGR-120-01 SU23

1. $\{a,b,c,d\}$; $\{a,b,c\}$, $\{a,b,d\}$, $\{a,c,d\}$, $\{b,c,d\}$; $\{a,b\}$, $\{a,c\}$, $\{a,d\}$, $\{b,c\}$, $\{b,d\}$, $\{c,d\}$; $\{a\}$, $\{b\}$, $\{c\}$, $\{d\}$; $\{\}$ (null set)

2. $(A \cup B)^c$ OR $A^c \cap B^c$ $\qquad$ $(A \cap B)^c$ OR $A^c \cup B^c$





3. a. $S-A = \{6,8,12\}$
   b. $B-A = \{2\}$
   c. $A \cup B = \{2,4,6,8,10\}$
   d. $A \cap B = \{4,10\}$
   e. $A' \cap B = \{6,8\}$

4. P(black balls) = 75/400
   P(green balls) = 50/400
   P(red balls) = 175/400
   P(white balls) = 70/400
   P(blue balls) = 30/400

5. $S = \{a_1, a_2, a_3, a_4, a_5, a_6\}$
   $A_1 = \{a_1, a_2, a_4\}$
   $A_2 = \{a_2, a_3, a_6\}$
   $A_3 = \{a_1, a_3, a_5\}$

(a) (i) $A_1 + A_2 = \{a_1, a_2, a_3, a_4, a_6\}$
(ii) $A_1 A_2 = \{a_2\}$
(iii) $A_3^c = \{a_2, a_4, a_6\}$
$A_1 + A_3^c = \{a_1, a_2, a_4, a_6\}$
$(A_1 + A_3^c) A_2 = \{a_2, a_6\}$

(b) $A_2 + A_3 = \{a_1, a_2, a_3, a_5, a_6\}$
$A_1(A_2 + A_3) = \{a_1, a_2\} \longrightarrow 1$
$A_1 A_2 = \{a_2\}$ $\quad$ $A_1 A_3 = \{a_1\}$
$A_1 A_2 + A_1 A_3 = \{a_1, a_2\} \longrightarrow 2$

$\therefore 1 = 2$