Math 1101   **Sets**   **Handout #11**

1. Let $\qquad U = \{1,2,3,4,5,6\}, \qquad A = \{1,2,5,6\}, \qquad$ and $\qquad B = \{2,3,5,6\}.$

    Find the following sets:

    (a) $A \cup B$

    (b) $A \cap B$

    (c) A^c

    (d) B^c

    (e) $A^c \cap B$

    (f) $A^c \cap B^c$

    (g) $A^c \cup B^c$

    (h) $U \cap B$

    (i) A^c

2. Let $\qquad U = \{a,b,c,d,e,f,g,h\} \qquad A = \{a,b,c,d\}, \qquad B = \{d,e,f,g\} \qquad$ and $\qquad C = \{b,c,d,h\}$

    Find each of the following sets:

    (a) $A \cap B$

    (b) $A \cup C$

    (c) $A \cap B^c$

    (d) $A \cup C^c$

    (e) $(A \cup C)^c$

    (f) $(A \cap C)^c$

    (g) $(A^c \cap C)^c$

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

3. Let $U = \{1,2,3,4,5,6,7,8,9,10\}$, $P = \{1,3,5,7,9\}$, $Q = \{2,4,6,8,10\}$,   and $R = \{1,2,4,5,8,9\}$

   Find the following:

   (a) $P \cup P^c$

   (b) $P \cap P^c$

   (c) $(P \cap R)^c$

   (d) $P^c \cap R^c$

   (e) $(P \cup R)^c$

   (f) $P^c \cup R^c$

   (g) $P \cup (Q \cap R)$

   (h) $(P \cap Q) \cup R$

   (i) $(P \cup Q \cup R)^c$

   (j) $P^c \cap (Q \cap R^c)$

   (k) $(P \cup Q^c) \cup (Q \cap R^c)$

4. Determine whether the following statements are true or false.

   (a) $a \in \{a,b,c,d\}$

   (b) $b \subseteq \{a, b, c, d\}$

   (c) $\{b\} \in \{a, b, c, d\}$

   (d) $\{a, b\} \subseteq \{a, b, c, d\}$

   (e) $\emptyset \subseteq \{1, 2, 3\}$

   (f) $\emptyset \in \{1, 2, 3\}$

   (g) $\{1, 2\} \subseteq \emptyset$

   (h) $A \cup A^c = \emptyset$

   (i) $A \cup A^c = U$

   (j) $A \cap A^c = \emptyset$