MATH 0401 - DISCRETE MATH STRUCTURES

Homework Chapter 3

1. For any set A, $A \cup \emptyset$ = ____ and $A \cap \overline{A}$ = _____

2. List the sets in P({Jo, Jet, Jay})

3. List the elements of the following sets (may be infinite)

   {x : x is a country in South America with less than 6 letters}

   {x : x $\in$ **R** and x/3 $\in$ **Z**}

   {x : x $\in$ **N** and $0 \leq x^2 \leq 10$}

   {x : x is a binary string of length 2}

   {x : x $\in$ $\mathbf{Z}^+$ and x mod 8 = 1}

   $\mathbf{Z}^+ \times \mathbf{Z}^+$

4. Suppose A = {x : x $\in$ **Z** and -30 < x < 30}, B = {x : x $\in$ **R** and -30 < x < 30}, C = {-10, -5, 0, 5, 10}
   Decide whether the following are True or False. **If False give a reason.**

   $B \subseteq A$

   $C \subseteq A$

   $|A| > |C|$

   $\pi \in B$

   $A \cup C = A$

   $\{23\} \in B$

5. If P = {a, b, c}, Q = {a, b, {c}}, R = {a, {b, c}}, S = {{a, b, c}} then
   |P| = ___ |Q| = ___ |R| = ___ |S| = ___ |P x P| = ___
   Circle the true statements below.

P is a subset of Q	P is a subset of S
P is a subset of R	P is a member of S
P = Q	P = S
P is not a subset of Q	Q = R

6. U = {current players in the NFL}, A = {current players on the Steelers} B = {college graduates}, C = {players who attended Penn State}. Express the following in terms of A, B, C.

   All players on the Steelers are college graduates
   There exists a player who went to Penn State but did not graduate from college
   Set of Steelers who did not attend Penn State
   Set of players who went to Penn State or are on the Steelers but not both

7. Suppose U = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}, A = {1, 4, 7, 8, 9, 10}, B = {1, 2, 5, 9}, C = {1, 2, 4, 6, 7, 9, 10} and D = {2, 5}. List elements of:

   $A \cup C$

   $A \oplus C$

   $D - B$

   $D \times B$

   $D \cap (\overline{A \cup C})$

   $\overline{A} \cup \overline{B} \cup \overline{C}$

   $\overline{A \cup B \cup C \cup D}$

   Fill in the blanks using either A, B, C, D:

   Sets A and _____ are disjoint |__| = 4 $A \cap \overline{D}$ = ___

   $D \subset$ ____ $(A \cap B) \not\subset$ _____ $1 \notin$ ____ |___ x D| = 14

   Draw a Venn Diagram showing U, A, B, C and placing all the elements in their correct regions.

   Using a different color, add a set representing D to the Venn diagram

Do the following questions on a separate sheet and staple them to this paper:

8. Additional Exercises 3.5.2 Parts b, c, e.

9. Additional Exercise 3.6.2

10. Additional Exercises 3.7.1, 3.7.2. **Explain all answers**