Section 1 Assignment (108 points)- Sets

To receive credit, you must either show your work on the worksheet or explain how you got the answer.

1. (6 points) Cardinality of a set defined by a Cartesian product.

   (a) (3 pts) What is $\left| \{1, 2, 4, 5, 7, 8\}^3 \right|$

   (b) (3 pts) What is $\left| \{a, b, c, d, e\}^2 \right|$

2. (10 points) Express each set in roster notation. Express the elements as strings, not n-tuples.

   (a) (5 pts) A^3, where $A = \{a, b\}$

   (b) (5 pts) B^2, where $B = \{1, 2, 3\}$

3. (18 points) Set Properties. Use the following sets to answer the questions.
   $U = \{a, b, c, d, e, f, g, h, i\}$ $A = \{c, d, e, i, h\}$ $B = \{a, b, c, d, e, f, i, h\}$ $C = \{d, \{e, f\}, g, h\}$

   a. (3 pts) T / F $\{a, b, c, h, i\} \subseteq U$

   b. (3 pts) T / F $\{\} \in C$

   c. (3 pts) T / F $\{e, f\} \in C$

   d. (3 pts) T / F $\{e, f, g, h\} \subseteq C$

e. (3 pts) T / F $A \subseteq U$

f. (3 pts) T / F $A \subset B$

4. (36 points) Set Operations. Use the following sets to answer the questions.
$U = \{a, b, c, d, x, y, z\}$ $A = \{b, c, x, y\}$ $B = \{a, b, c, z\}$ $C = \{a, b, d, y\}$

a. (6 pts) What is $A \cup C$?

b. (6 pts) What is $A \cap B \cap C$?

c. (6 pts) What is $\overline{A \cap C}$?

d. (8 pts) List all subsets of $C \cap (A \cup B)$.

e. (10 pts) Draw the Venn diagram for these sets (U, A, B, C).
$U = \{a, b, c, d, x, y, z\}$ $A = \{b, c, x, y\}$ $B = \{a, b, c, z\}$ $C = \{a, b, d, y\}$

5. (20 points) Set Properties and Operations. Use the following sets to answer the questions.
U = {a, b, c, d, x, y, z} A = {b, c, x, y} B = {a, b, c, z} C = {a, b, d, y}

   a. (3 pt) Find C – B

   b. (3 pt) Find B - C

   c. (6 pt) Find A $\oplus$ B

   d. (8 pts) Find $|\ \overline{B \oplus C}\ |$

6. (18 points) Cartesian Product of sets. Use the following sets to answer the questions.
A = {1, 2, 3, 4, 5}
B = {x, y, z, w}
C = {q, r, s, t}

   a. (3 pt) T / F (5, s) $\in$ A x C

   b. (3 pt) T / F (q, 5) $\in$ B x A

   c. (3 pt) T / F (r, r) $\in$ B x B

   d. (3 pt) T / F (t, s, 4) $\in$ C x B x A

   e. (6 pt) Find $|$ A x B $|$