Math 116: Written Homework Set 7

This assignment is due on Tuesday, October 24th in class. Show all work where possible! Answers magically appearing will receive no credit.

1. Which of the following sets are well-defined?
   a. {1, 2, 3, 4, 5}
   b. The set of great cities in which to live.
   c. {x | x is a U.S. state}
   d. {x | x is a fun game}

2. Find the cardinality of the following sets.
   a. {A, B, C, D, E, F}
   b. {x | x is a U.S. state}

3. State whether each of the pairs of sets are equal, equivalent, or neither.
   a. {1, 2, 3} and {3, 2, 1}
   b. {6, 8, 10, 12} and {1, 2, 3, 4}

4. Determine whether the following statements are true or false.
   a. $b \in \{a, b, c\}$
   b. $\{b\} \in \{a, b, c\}$
   c. $\{b\} \subseteq \{a, b, c\}$
   d. $\{a, b, c\} \subset \{a, b, c\}$
   e. $\{a, b, c\} \subseteq \{a, b, c\}$
   f. $\emptyset = \{\ \}$
   g. $\emptyset \subset \{\ a, b\ c\ \}$
   h. {1, 2} and {1, 2, 3} are both equal and equivalent

5. If the universal set is $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$, find the complement of the following sets.
   a. $\{1, 3, 4, 8, 9\}$
   b. The set of odd counting numbers less than 8.

6. Find the <u>number</u> and <u>list</u> all of the subsets of the following sets.
   a. {1, 2, 3}
   b. {h, e, l, p}

Selected Answers

1. a. Is well-defined.
   b. Not well-defined. Not clear on what defines a great city.

2. a. 6

3. a. Both equivalent (both have 3 elements) and equal (have the exact same elements).

4. a. True
   d. False. Even though a set is a subset of itself, it is not a proper subset.
   g. True
   h. False. The sets are neither equal or equivalent.

5. a. $\{0, 2, 5, 6, 7\}$

6. Since the set has $n = 3$ elements, the set has $2^3 = 8$ elements. The 8 subsets are

$$\{\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$$