WORKSHOP 9: §3.5-3.7 FEBRUARY 9, 2017

Name: ______________________________

(1) For which of the following sets is 2 an element? For which is $\{2\}$ an element? What is the cardinality of each set?
  (a) $\{1, 2, 3\}$
  (b) $\{2\}$
  (c) $\varnothing$
  (d) $\{\varnothing\}$
  (e) $\{\{2\}\}$
  (f) $\{\{2\}, \{\{2\}\}\}$
  (g) $\{2, \{\{2\}\}, \{2, \{2\}\}\}$

(2) Write the following sets in roster notation:
  (a) $\{1, 2\} \times \{1, 3\}$
  (b) $\mathcal{P}(\{1, 2\})$
  (c) $\mathcal{P}(\{1, \{1\}\})$

(3) What is the cardinality of $A \times B$, in terms of $|A|$ and $|B|$?

(4) Prove that if $\mathcal{P}(A) = \mathcal{P}(B)$, then $A = B$.

(5) Let $S = \{1, 2, 3\}$, and let S_i be the set of all subsets of S with cardinality i. Is $\{S_0, S_1, S_2, S_3\}$ a partition of $\mathcal{P}(S)$?

(6) (a) Let $S = \{1, 2, 3\}$, $X = \mathcal{P}(S)$, and Y be the set of all binary strings of length 3. What is the cardinality of X? Of Y?
  (b) Pair off the elements of X and Y in a meaningful way.
  (c) Generalize this to $S = \{1, 2, \ldots, n\}$ and Y the set of binary strings of length n.
  (d) Use problem 3 to prove Theorem 3.6.1: for every finite set A, $|\mathcal{P}(A)| = 2^{|A|}$.