MATH 327, HOMEWORK #1

Problem 1. Show that the following pairs of sets are not equal by exhibiting an element of one that is not an element of the other.

(a)
$$A = \{1, 2\}$$
$$B = \big\{1, \{2\}\big\}$$

(b)
$$C = \mathcal{P}\left(\{1, 2\}\right)$$
$$D = \big\{\{1\}, \{2\}, \{1, 2\}\big\}$$

(c)
$$E = \{1, 2\} \times \{2, 3\}$$
$$F = \{3, 2\} \times \{2, 1\}$$

Problem 2. Let
$$A = \{1, 2, 4\}$$
$$B = \{1, 2, 5\}$$
List the elements of the following sets, *without repeating* any elements:

(a)
$$\big\{\{m, n\} \big| \, m \in A \text{ and } n \in B\big\}$$

(b)
$$\big\{(m, n) \big| \, m \in A \text{ and } n \in B\big\}$$

Problem 3. List every subset S of $\{1, 2, 3, 4, 5\}$ for which
$$S \cap \{1, 3, 5\} \subseteq \{1\}$$

Problem 4. Number 28 of section 2.2.

Problem 5. True or false:

(a) $(1, 1) \in \{(1, 1), (1, 2), (2, 1)\} \cap \{(1, 2), (2, 1)\}$;
(b) $\{1, 2\} \in \{(1, 1), (1, 2), (2, 1)\}$;
(c) $(1, 2) \in \{1, 2\} \times \{2, 3\}$.

Problem 6. Show that if

$$A \neq B$$

then

$$\mathcal{P}(A) \neq \mathcal{P}(B).$$