Name: _____

Directions: Solve the following problems. Give supporting work/justification where appropriate.

1. **[2 parts, 1 point each]** Let $A = \{1, 2, \varnothing\}$ and $B = \{5, \varnothing\}$. Find the following sets.

   (a) $A \times B$

   (b) B^3

2. **[1 point]** Suppose that $(1, 2) \in A \times B$ and $(2, 3) \in A \times B$. Find two more elements in $A \times B$.

3. **[3 parts, 1 point each]** Decide whether the following statements are true or false. Write the entire word true or the entire word false to indicate your answer. No explanations or justification required.

   (a) $\{1, 2, 3\} \in \{1, 2, 3\}$

   (b) $\{\mathbb{Q}\} \in \{\mathbb{Z}, \mathbb{Q}, \mathbb{R}\}$

   (c) $\{\mathbb{Q}\} \subseteq \{\mathbb{Z}, \mathbb{Q}, \mathbb{R}\}$

4. **[3 parts, 1 point each]** Find the following power sets.

   (a) $\mathcal{P}(\{a, b, c\})$

   (b) $\mathcal{P}(\{\{1, 2\}, \{3\}\})$

   (c) $\mathcal{P}(\{6, 7\} \times \{8\})$

5. **[1 point]** Let $A = \{1, 2, 3, 4\}$. Express the set $\{X \subseteq A\colon\ |X| \text{ is odd}\}$ by listing its elements between braces.