

Name: _____

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

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

(a) $A \times B$

(b) $A \times A \times B$

2. [**1 point**] Give an example of an element in $\mathbb{R}^2 \times \mathbb{R}^3 \times \mathbb{R}$.

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) $\{1, 2, 3\} \in \{1, 2, 3, 4\}$

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

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

4. [2 parts, 1 point each] Find the following power sets.

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

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

5. [1 point] Let A and B be sets, and suppose that $\mathcal{P}(A) \times B = \emptyset$. What, if anything, can we conclude about A and B ? Explain.

6. [1 point] Let $A = \{1, 2, 3, 4\}$. Express the set $\{X \subseteq A : |X| \in \{2, 3\}\}$ by listing its elements between braces.