

Name: _____

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

1. **[6 parts, 1 point each]** Let the universe U be $\{-3, -2, -1, 0, 1, 2, 3\}$. Let $A = \{-1, 0, 1\}$, $B = \{1, 2\}$, and $C = \{-1, 2, 3\}$. Find the following sets.

(a) $B \cap A$

(b) $A - B$

(c) $B \cup \overline{A}$

(d) $(B \times C) - (C \times B)$

(e) $\mathcal{P}(A) - \mathcal{P}(B \cup C)$

(f) $\mathcal{P}(A) - (\mathcal{P}(B) \cup \mathcal{P}(C))$

2. [1 point] Is it true that $(A - B) \times (C - D)$ equals $(A \times C) - (B \times D)$ for all sets A, B, C, D ? Explain why or why not.

3. [3 parts, 1 point each] Let $A = \{(x, y) \in \mathbb{R}^2: y \geq x\}$ and $B = \{(x, y) \in \mathbb{R}^2: x^2 + y^2 \leq 1\}$. Sketch the following sets in the plane, using solid lines to represent boundaries that are in the set, and dashed lines/open circles to represent boundaries that are not in the set.

(a) A

(b) B

(c) $B - A$