Math 8: Sets

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1. Answer the questions from the lecture notes: Let $A = \{1, 2\}$ and $B = \{1, 3, 5\}$.

(a) Find $A \cup B$, $A \cap B$, $B \setminus A$, $A \setminus B$, and $A \times B$.

(b) Find $P(A)$ and $P(B)$.

2. Let A and B be given sets.

(a) $P(A \cup B) \supseteq P(A) \cup P(B)$

(b) Prove that $A = (A \cap B) \cup (A \setminus B)$

3. Consider a chess tournament in which N people enter. You can represent each person by an integer, and the result of each game can be represented by an ordered pair (n, m), indicating that person n won against person m. (Why is important we used the ordered pairs (n, m), rather than the sets $\{n, m\}$? Can you think of other ways to represent the games using only sets?) Consider the set

$$S = \{(n, m) \in \{1, 2, ..., N\} \times \{1, 2, ..., N\} : n \text{ won a game against } m\}$$

If this is a knockout tournament (so anyone who loses a game is eliminated, until there is only one person left, who won all his or her games), how many elements are in S?