Calculus I
(MATH 1525)
Handout I - Homework Jan 16, 2004

Problem 1. Set $A = \{1, 2, 3, 4, 5\}$, $B = \{1, 3, 5, 7, 9\}$, $O = \{x \in \mathbb{Z} \mid x \text{ is odd}\}$, and $P = \{x \in \mathbb{Z} \mid x \text{ is prime}\}$. Compute the following:

(a) $A \cup B$, $A \cap B$, $A \setminus B$, $B \setminus A$;

(b) $A \cap O$, $A \setminus O$, $A \cap P$, $A \setminus P$;

(c) $O \cap [0, 20]$, $P \cap [0, 20]$;

(d) $[1, 5] \cup [3, 7]$; $[1, 5] \cap [3, 7]$; $[1, 5] \setminus [3, 7]$;

(e) $(O \cap [0, \infty]) \setminus P$;

(f) $A \times B$;

(g) $(A \cap O) \times (B \cap P)$.

Problem 2. Let $A = \{1, 2, 3\}$ and $B = \{1, 3, 5\}$. Graph the following sets:

(a) $A \times B$;

(b) $[1, 2] \times [2, 3)$.

Problem 3. Let A and B be sets. Define the *symmetric difference* of A and B to be

$$A \triangle B = \{x \mid x \text{ is in } A \text{ or } x \text{ is in } B, \text{ but not both}\}.$$

(a) Draw a Venn diagram which describes symmetric difference.

(b) Write a expression for $A \triangle B$ using the symbols A, B, $\cup$, $\cap$, $\setminus$, and parentheses.

(c) Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 7, 9\}$. Find $A \triangle B$.