# CS 173, Spring 2015
# Examlet 3, Part A

**NETID:**

**FIRST:**

**LAST:**

**Discussion: Monday 9 10 11 12 1 2 3 4 5**

$A = \{(a, b) \in \mathbb{R}^2 \ : \ a = 3 - b^2\}$

$B = \{(x, y) \in \mathbb{R}^2 \ : \ |x| \geq 1 \text{ or } |y| \geq 1\}$

Prove that A $\subseteq$ B. Hint: you may find proof by cases helpful.

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$A = \{(x, y) \in \mathbb{Z}^2 \mid 2xy + 6y - 5x - 15 \geq 0\}$

$B = \{(a, b) \in \mathbb{Z}^2 \mid a \geq 0\}$

$C = \{(p, q) \in \mathbb{Z}^2 \mid q \geq 0\}$

Prove that $(A \cap B) \subseteq C$.

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$A = \{(x, y) \in \mathbb{R}^2 \ : \ x^2 + y^2 \leq 1\}$

$B = \{(p, q) \in \mathbb{R}^2 \ : q \geq p^2 - 5\}$

$C = \{(a, b) \in \mathbb{R}^2 \ : \ |x| \leq 3\}$

Prove that $A \cap B \subseteq C$.

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$A = \{(x, y) \in \mathbb{R}^2 \mid x = \lfloor 3y + 5 \rfloor \}$

$B = \{(p, q) \in \mathbb{Z}^2 \mid 2p + q \equiv 3 \pmod 7 \}$

Prove that $A \cap \mathbb{Z}^2 \subseteq B$.

Use the following definition of congruence mod $k$: if $s$, $t$, $k$ are integers, $k$ positive, then $s \equiv t \pmod k$ if and only if $s = t + nk$ for some integer $n$.

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$A = \{(a, b) \in \mathbb{R}^2 \ : \ b = a^2 - 2\}$

$B = \{(x, y) \in \mathbb{R}^2 \ : \ \lfloor x \rfloor = 4\}$

$C = \{(p, q) \in \mathbb{R}^2 \ : \ 2p \leq q\}$

Prove that $A \cap B \subseteq$ C.

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$A = \{(x, y) \in \mathbb{R}^2 \ : \ 0.3 \leq xy \leq 10.5\}$

$B = \{(a, b) \in \mathbb{Z}^2 \ : \ a > 4\}$

$C = \{(p, q) \in \mathbb{Z}^2 \ : \ q \leq 2\}$

Prove that $A \cap B \subseteq$ C.