

# Assignment # 1.

## Due Sept. 18, 13:00

**Problem 1.** Let  $A, B, C$  be sets. Prove that  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ .

**Problem 2.** Let  $P, Q, R$  be statements. Provide truth table for

a.  $(P \text{ and } Q) \Rightarrow R$ ,                      b.  $P \Rightarrow (Q \text{ or } R)$ .

**Problem 3.** Determine if the following statement is true or false. Explain your answer. Write negations.

- a.  $\forall x \in \mathbb{Z} \exists y \in \mathbb{Z} \quad yx = 5$ ,
- b.  $\forall x \in \mathbb{Z} \exists y \in \mathbb{Z} \quad |x| = y^2 - 4y + 4$ ,
- c.  $\exists x \in \mathbb{Z} \forall y \in \mathbb{Z} \quad |y| = x^2 - 4x + 4$ .