# Math 111, Fall 2014 - Homework \# 9 <br> Due Thursday, November 13, 2014, by 4:30 p.m. 

Determine whether or not each of the statements is true or false. Prove your assertion.

1. Suppose $A, B$, and $C$ are sets. If $A \subseteq B$, then $A-C \subseteq B-C$.

## Solution:

2. If $A, B$, and $C$ are sets, then $A \times(B \cup C)=(A \times B) \cup(A \times C)$.

## Solution:

3. Suppose that $A$ and $B$ are sets. Then $A \subseteq B$ if and only if $A \cap B=A$.

## Solution:

4. For every rational number $\frac{a}{b}$, where $a, b \in \mathbb{N}$, there exists a rational number $\frac{c}{d}$, where $c$ and $d$ are positive odd integers, such that $0<\frac{c}{d}<\frac{a}{b}$.

## Solution:

5. If $A$ and $B$ are sets and $A \cap B=\varnothing$, then $\mathcal{P}(A)-\mathcal{P}(B) \subseteq \mathcal{P}(A-B)$.

## Solution:

6. For all positive real numbers $x, 2^{x} \geq x+1$.

## Solution:

7. Suppose $a, b \in \mathbb{Z}$. If $a \mid b$ and $b \mid a$, then $a=b$.

## Solution:

8. The sum of two distinct irrational numbers is irrational.

## Solution:

9. If $x$ and $y$ are real numbers such that $|x+y|=|x|+|y|$, then either $x=0$ or $y=0$.

## Solution:

