Math 111, Fall 2014 - Homework # 9

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 $A \cap B = \emptyset$, then $\mathcal{P}(A) \mathcal{P}(B) \subseteq \mathcal{P}(A B)$. Solution:
- 6. For all positive real numbers $x, 2^x \ge x + 1$. 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: