

Homework 2 due Thursday July 2nd

Chapter 1 problems

1. Verify the Law of Modus Ponens

$$[P \wedge (P \Rightarrow Q)] \Rightarrow Q$$

is a tautology. (In practice, the Law of Modus Ponens means if we know P is true and we know $P \Rightarrow Q$ is true, then it's okay to assume Q is also true.)

2. Prove or give a counterexample: for all natural numbers m , if m^2 is odd, then m must be odd.
3. Section 1.5 # 11.
4. Prove: for all real numbers $\epsilon > 0$, there exists a natural number N so that $\frac{1}{N^3} < \epsilon$.
5. Section 1.7 # 2(b)(c).

Chapter 2 problems

6. Define the set $X_a = \{x : x \in \mathbb{Z} \text{ and } x^2 < a\}$ for each $a \in \mathbb{N}$.
 - (a) How many elements does X_{12} contain? List them.
 - (b) For which values of a is the equation $X_a = X_{12}$ true?
 - (c) Find the intersection $\bigcap_{a \in \mathbb{N}} X_a$ and the union $\bigcup_{a \in \mathbb{N}} X_a$.
7. Section 2.1 # 8(a)(c), 11.
8. Section 2.2 # 3(a)(i)(l)(m), 13(b)(c), 14(b).
9. Let A and B be sets. Prove that $A \setminus B = A \cap B^c$.