MAT 150, Introduction to Advanced Mathematics Name _____

Homework 3, due by 9/29

Score_____

1. In the text "Prime numbers" posted on Blackboard, in the proof of infinity of the set of prime numbers in the arithmetic sequence $3\mathbb{N}+2$ there are gaps. Find them and propose your ways of repair of the proof.

2. Let $x \in \mathbb{R}$. Determine the truth value of the following predicates:

(1) $(x > 0 \vee x^2 = 1) \implies x \geq 1$
(2) $(x > 0 \wedge x^2 = 1) \implies x \geq 1$
(3) $x^2 = 4 \implies (x = 2 \vee x < 0)$
(4) $x \in (-2, 2) \implies (|x-2| \leq 2 \wedge |x+2| \leq 2)$
(5) $x \in (-2, 2) \implies (|x-2| \leq 2 \vee |x+2| \leq 2)$

3. Bonus problem. What sets of primes can you prove to be infinite?

(a) the sets of primes in arithmetic series $4\mathbb{N}$; $4\mathbb{N}+1$; $2+4\mathbb{N}$; $3+5\mathbb{N}$.

(b) the sets of primes with the last digit 3 or 7 (i.e., having the last digit 3 or 7 in the decimal notation)?