MAT 200 Logic, Language and Proof Name _____

Homework 3

due 9/16 Score_____

1. (6pt)

Using only ε-δ definition of limit verify if $\lim_{x\to 3}(2x-1)=5$. Provide a graphical illustration.

Using only ε-δ definition of limit verify if $\lim_{x\to 2}(3x+1)\neq 5$. Provide a graphical illustration.

2. (6pt)

Adjust ε-δ definition of limit of a function to the situation when x tends to infinity, that is, explain what it means that $\lim_{x\to\infty} f(x)=L$, where $L\in\mathbb{R}$. Provide a graphical illustration.

3. (6pt)
Below the definition of *bounded* function is given.

A function f is said to be *bounded* on a set A if there exists a number M such that the absolute value of $f(x)$ is less than or equal to M for each x in A.

a) Write the definition in a symbolic form.

b) Explain what it means that a function is **not** bounded on a set (both in words and in symbols).

c) Give an example of bounded function and an example of unbounded (that is, not bounded) function. (Do not forget to specify a set where the functions are bounded/unbounded.) Explain (using the definition above) why your functions are bounded/unbounded.

4. (6pt)
Let $f : \mathbb{R} \to \mathbb{R}$ be a function. Define what it means that f is *periodic*. Write the definition in symbolic form. What is a *period* of a periodic function? How many periods may a periodic function have? Explain!