Math 117 Fall 2014 Midterm Exam 2

Oct. 24, 2014 10am - 10:50am. Total 20+2 Pts

NAME: ID#:

- There are five questions.
- Please write clearly and show enough work.

1	
2	
3	
4	
5	
Total	

Question 1. (5 pts) *Prove* ***by definition****:*

$$\lim_{x \to 1} x^4 = 1. \tag{1}$$

Question 2. (5 pts) *Prove* ***by definition****:*

$$\lim_{n\to\infty} \frac{3^n}{n} = +\infty. \tag{2}$$

Question 3. (5 pts) *Let* $a_n = (-1)^n - \frac{\sin n^2}{n}$. *Calculate* $\liminf_{n\to\infty} a_n$ *and justify your answer.*

Question 4. (5 pts) *Let* $\{a_n\}$ *be increasing and not Cauchy. Prove that* $\lim_{n\to\infty} a_n = +\infty$.

Question 5. (Extra 2 pts) *Let* $f(x), g(x): \mathbb{R} \mapsto \mathbb{R}$ *and* $a, b, L \in \mathbb{R}$. *Assume* $\lim_{x \to a} f(x) = b$ *and* $\lim_{x \to b} g(x) = L$. *Prove or disprove:* $\lim_{x \to a} g(f(x)) = L$.

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