Quiz 1

MAT175 Section B402

September 20th, 2012

Instructions: Print your name on the top of your yellow work sheets. This quiz is closed-book and closed-note. You are not allowed to talk to other students. To receive full scores, write all details explicitly. Answers without justifications and/or calculation steps may receive no score.

1. The $\epsilon - \delta$ definition of limit is the following: "A real-valued function f defined on an interval I, except possibly at $a \in I$, is said to have a limit L as x approaches to $a \in \mathbb{R}$ if for every $\epsilon > 0$ there exists $\delta > 0$ such that $0 < |x - a| < \delta$ implies $|f(x) - L| < \epsilon$." Now let $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = 2x + 3$. By using the given definition of limit, prove that $f(x) \to 5$ as $x \to 1$. What if f is defined only on $\mathbb{R} - \{1\}$? Using the given definition, argue whether or not the limit exists in this case.(20 points)

2. (1)(20 points) Evaluate
$$\lim_{x \to 2} \frac{x^5 - 32}{x - 2}.$$

(2)(20 points) Evaluate
$$\lim_{\delta x \to 0} \frac{\sin(x + \delta x) - \sin x}{\delta x}.$$

Hint: $\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$.

3.(20 points) Evaluate
$$\lim_{x \to 4} \frac{\sqrt{x + 5} - 3}{x - 4}.$$

4.(20 points) Evaluate
$$\lim_{\theta \to 0} \frac{\cos \theta \tan \theta}{\theta}.$$