MATH 1007 E – Test 1

Wednesday, October 3rd, 2012

NAME: _____

STUDENT NUMBER: _____

This test has 6 questions (worth a total of 20 marks). Calculators are not allowed. You have 50 minutes. Write your answers in the spaces provided and put a box around the final answers where appropriate.

1. (2 points) Given $f(x) = \cos x$ and $g(x) = \ln(2 + x^2)$, find $f \circ g$ and $g \circ f$.

2. (1 point) What is $\cos(\arctan(1))$?

3. (3 points) If $f(x) = e^{\tan(x+1)}$, what is $f^{-1}(x)$?

4. (4 points) What is the average rate of change of $f(x) = 4\sqrt{x}$ on the intervals $[4, 16]$ and $[4, 9]$? What do you think the instantaneous rate of change at $x = 4$ would be?

5. (5 points) Evaluate the limits:

(a) $\lim_{x\to 3} \dfrac{x^2-9}{x-3}$ (b) $\lim_{x\to 16} \dfrac{\sqrt{x}-4}{x-16}$ (c) $\lim_{x\to 0} \dfrac{x^2+1}{\sqrt{x+4}}$

6. (5 points) Consider the function $f(x) = \begin{cases} 3x & x < 1 \\ x+2 & x > 1 \end{cases}$.

(a) Find $\lim_{x\to 1^-} f(x)$.

(b) Find $\lim_{x\to 1^+} f(x)$.

(c) Does $\lim_{x\to 1} f(x)$ exist? Why or why not?

(d) Is $f(x)$ continuous at $x = 1$? Why or why not?