Name (print): _____

Signature: _____

ID Number: _____

Section (circle): 1 2 3 4 5 6 7 8 9 10 11

MATH 137, Calculus 1 for Honours Mathematics

Faculty of Mathematics, University of Waterloo
Midterm Test, Fall Term 2012
Date: Monday, October 22
Time: 7:00 pm-9:00 pm

Section	Time	Instructor
1	8:30-9:20	F. Zorzitto
2	9:30-10:20	M. Eden
3	10:30-11:20	J. Lawrence
4	11:30-12:20	M. Eden
5	2:30-3:20	S. New
6	9:30-10:20	D. Park
7	8:30-9:20	C. Hewitt
8	11:30-12:20	E. Vrscay
9	9:30-10:20	F. Vinette
10	8:30-9:20	D. Park
11	11:30-12:20	C. Hewitt

Question	Mark
1	/10
2	/10
3	/10
4	/10
5	/10
Total	/50

Pages: This test contains 7 pages, including this
cover sheet and a page at the end for rough work.

Instructions: Write your name, signature and
ID number, and circle your section, at the top
of this page. Answer all questions, and provide
full explanations. No calculators are allowed.

[3]   **1:** (a) Find the exact value of $\cos\left(-\frac{8\pi}{3}\right)$.

[3]   (b) Use the formula $\sin(2\theta) = 2\sin\theta\cos\theta$ to find the exact value of $\sin\left(2\tan^{-1}\frac{1}{3}\right)$.

[4]   (c) Find all values of $x \in [0, 2\pi]$ such that $\sin\left(x - \frac{\pi}{6}\right) = \cos x$.

2: Let $f(x) = \dfrac{2e^x + 1}{e^x - 1}$.

[2]   (a) Find the domain of f.

[4]   (b) Find a formula for the inverse function f^{-1}.

[4]   (c) Find the range of f (which is equal to the domain of f^{-1}).

3: Evaluate each of the following limits, if they exist or are infinite.

[3]   (a) $\displaystyle\lim_{x\to 1} \frac{\sqrt{3x+1}-2}{x-1}$.

[3]   (b) $\displaystyle\lim_{x\to 2^-} \frac{|x^2-3x+2|}{x-2}$.

[4]   (c) $\displaystyle\lim_{x\to 0^-} \sin^{-1}\left(\frac{1}{2+e^{1/x}}\right)$.

[5]   **4:** (a) Use the definition of the limit to show that $\lim\limits_{x \to 2} \left(x^2 - x - 3\right) = -1$.

[5]   (b) Suppose that $\lim\limits_{x \to a} f(x) = L$ and $\lim\limits_{x \to a} g(x) = M$. Prove that $\lim\limits_{x \to a} \left(f(x) + g(x)\right) = L + M$.

5: Let $f(x) = \dfrac{1}{\sqrt{x}}$ for $x > 0$.

[5] (a) Use the definition of the derivative to find $f'(x)$.

[5] (b) Find the equation of the tangent line to the curve $y = f(x)$ at the point where the tangent line has slope -4.

This page is for rough work. It will not be marked.