CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number	Section(s)
Mathematics	209	ALL
Examination	**Date**	**Pages**
Final	April 2013	2

Instructors	Course Examiner
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Special Instructions

- ▷ Ruled booklets to be used.
- ▷ Only approved calculators are allowed.

MARKS

[12] **1.** (a) Find $\lim_{x\to -4} \dfrac{4x^2+7x-36}{x^2+28x+96}$

(b) Find $\lim_{x\to 2} \dfrac{4-\sqrt{6x+4}}{3x^2-12}$

(c) Give an example of a function f defined for all real numbers which has the property that $\lim_{x\to+\infty} f$ and $\lim_{x\to-\infty} f$ are both equal to $+\infty$.

[8] **2.** Find dg if $g = x^{1.5}$, $x = 4$, and the change in the x is 0.1. What is the value of Δg for these values?

[12] **3.** Find the derivatives of the following functions. YOU DO NOT HAVE TO SIMPLIFY.

(A) $f(x) = \frac{7^3}{\sqrt{x^5}} - 70x^3 - e^x$.

(B) $g(x) = (3x^5 + lnx - e^3x)(5\sqrt{x} - \frac{8}{x} - 5x + 7)$.

(C) $h(x) = x^2 ln(x) - \frac{5}{4x} - e^{(-x^3+6)}$.

(D) $m(x) = [x^5 - 3ln(x^3+6)]^{10}$.

[8] **4.** Use implicit differentiation to find $y' = dy/dx$

$$2x^5y^3 - 5x^3 + y^2 lnx = 7y + 4x - 10$$

[10] **5.** Boyle's law for enclosed gases states that if the temperature is kept constant, the pressure P and volume V of a gas are related by the equation $VP = k$ where k is constant. If the volume is decreasing by 5 cubic inches per second, what is the rate of change of pressure when the volume is 1,000 cubic inches and the pressure is 40 pounds per square inch?

[10] **6.** Use the price-demand equation $p = 90 - 0.1x^2$ to find the values of p for which the demand is elastic and for which the demand is inelastic.

[12] **7.** Graph the sales function $N(x) = 4x^3 - 0.25x^4 + 500$ over the interval $0 \leq x \leq 12$. Determine when N is increasing, when it is decreasing. Does N have a maximum? If so, find it. Does N have a point of inflection? If so, find it.

[8] **8.** Find the absolute maximum and absolute minimum for the function

$f(x) = x^3 - 21x^2 + 135x - 170$ on the interval $[2, 12]$.

[10] **9.** Compute the following:

(A) $\int e^{-2x}\, dx.$

(B) $\int (3x^4 - 5x^7)\, dx$.

(C) $\int \left(\frac{x^2}{(x^3-5)^7}\right) dx.$

(D) $\int_2^3 \left(4x - \frac{5}{x} + 3e^x\right) dx.$

[10] **10.** Suppose that a country has Lorentz curve of the form $f(x) = x^a$ and a Gini index of 0.286 . Find a.