AN eCONCORDIA EXAMINATION

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	**Number**	**Section**
Mathematics	209/2	EC
Examination	**Date**	**Pages**
Final	December 2014	2
Instructors		**Course Examiner**
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Special Instructions

▷ **Only approved calculators are allowed.**

Evaluation

▷ **The examination counts for 50% towards your final grade.**

MARKS

[9] **1.** Find the following limits:

(a) $\lim\limits_{x\to 1^-} \dfrac{|x-1|}{x-1}$ (b) $\lim\limits_{x\to -2} \dfrac{(x+2)^2}{x^2-4}$ (c) $\lim\limits_{x\to \infty} \dfrac{x^2+4}{4-25x^2}$

[18] **2.** Find the derivative for each of the following (you do not need to simplify):

(a) $y = 5x^{-7} - 2x^{-4}$

(b) $y = \dfrac{5}{x^{\frac{1}{5}}} - \dfrac{8}{x^{\frac{3}{2}}}$

(c) $y = \dfrac{2x^5 - 4x^3 + 2x}{x^3}$

(d) $y = (1 + e^x)\ln x$

(e) $y = \dfrac{\log_2 x}{1 + x^2}$

(f) $y = 2\ln(x^2 - 3x + 4)$

[6] **3.** Use implicit differentiation to find $y' = \frac{dy}{dx}$ for $xe^y - y = x^2 - 2$.

[10] **4.** A manufacturer of sunglasses currently sells one type for \$15 a pair. The price p and the demand x for these glasses are related by

$$x = f(p) = 9,500 - 250p$$

(a) Calculate Elasticity E.

(b) Use answer in (a) to find whether revenue increase or decrease.

[12] **5.** Given $f(x) = x^4(x-6)^2$ find:

(a) the critical values of f.

(b) the intervals where $f(x)$ is increasing;

(c) the intervals where $f(x)$ is decreasing;

(d) the local maxima and minima.

[6] **6.** Given $g(x) = \ln(x^2 - 2x + 10)$ find:

(a) the intervals where $g(x)$ is concave upward;

(b) the intervals where $g(x)$ is concave downward;

(c) the inflection point(s);

[6] **7.** Find the absolute extrema of $f(x) = x^4 - 8x^2 + 16$ on the interval $[-3, 4]$.

[9] **8.** Evaluate the following; answers must be accurate to 3 decimals:

(a) $\int_{-5}^{5}(10 - 7x + x^2)dx$

(b) $\int_0^1 xe^{-2x^2}dx$

(c) $\int_0^3 \frac{x}{(1+x^2)^2}dx$

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

(a) $\int \frac{x^2e^x - 2x}{x^2}dx$

(b) $\int \frac{x}{\sqrt{x+5}}dx$

(c) $\int x^3(2x^4 + 5)^5dx$

(d) $\int \frac{e^{-x}}{(e^{-x}+3)}dx$

[10] **10.** Find the area bounded by $y = x^3 + 1$ and $y = x + 1$.

[4] **11.** If the exponential growth law applies to Canada's population growth, at what continuous compound growth rate will the population double over the next 100 years?