check

[3] 4. (a) Find the value of the differential dy at $x = 3$, with change in x as 0.2, where $y = \ln(2x + 3)$.

[3] (b) At what annual rate of interest compounded continuously must money be invested to double in 10 years?

check

[5] **5.** The total cost (in dollars) of producing x electric guitars is

$$C(x) = 1,000 + 100x - 0.25x^2$$

(a) Find the exact cost of producing 51st guitar. → $C(51) - C(50)$

(b) Use marginal cost of producing the 51st guitar. → $C'(50)$

$C(51) \approx C(50) + C(50)$

$C(51) - C(50) \approx$

$C(50) - C(50) - C50$

[5] 6. Use implicit differentiation to fine $y'(or \frac{dy}{dx})$ where,

$$e^y = x^2 + y^2 + 3y.$$

w.r.t x

[5] 7. A point is moving on the graph of $4x^2 + 9y^2 = 180$. When the point is at $(3, 4)$, its y-coordinate is decreasing by 2 units per second. How fast is its x-coordinate changing at that moment?

related. $x' = \frac{dx}{dt}$ not like $x' = \frac{dx}{dx} = 1$

dt. $y' = \frac{dy}{dt}$ $\frac{dy}{dt}$

$(x^4)' = 4x^3 \cdot x'$

$(y^3)' = 3y^2 y'$

CONCORDIA UNIVERSITY
Department of Mathematics & Statistics

Course	Number		Section(s)
Mathematics	209		CA
Examination	**Date**	**Time**	**Pages**
Midterm	July 20, 2017	1h 30 min	2
Instructors			**Course Examiner**
L. Dube			R. Raphael

Special Instructions:

- ▷ Show your work in all problems.
- ▷ Only approved calculators are allowed.

MARKS

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

(a) $\lim\limits_{x\to 3} \dfrac{x^2-6x+9}{x^2-2x-3}$

(b) $\lim\limits_{x\to -2} \dfrac{x^2+5x+6}{x^3+8}$

(c) $\lim\limits_{x\to \infty} \dfrac{6x^3+5x-5}{4x^3+7x}$

[5] **2.** Let $f(x) = 2x^2 - 5x + 7$, find the derivative of $f(x)$ by definition (four step method). Also, find the equation of the tangent line at $x = 2$ for above function.

[15] **3.** Find the derivative $f'(x)$ of the following functions $f(x)$, (do not simplify):

(a) $f(x) = 2x^5 - 7x^3 + 5x + 3$

(b) $f(x) = \dfrac{x^{-6}}{8} + \sqrt[3]{x}$

(c) $f(x) = \ln(4x^3+3) + e^{2x+5}$

(d) $f(x) = (2x^3+x^2)^4 \cdot (-x^4+2)^3$

(e) $f(x) = \dfrac{3x^3-4}{x^3+5}$

Complete

Check

don't touch in parenthesis

$x^{1/3}$

$\left(\frac{1}{8}\cdot x^{-6}\right)' - \frac{3}{4}^{-7} + \frac{1}{3}x^{-2/3}$

$c\left(\ln 4x^3+3\right)' + \left(e^{2x+5}\right)'$

$\frac{1}{4x^3+3}\cdot 12x^2 + e^{2x+5}\cdot 2$

Derivative of ln is only x.

$\ln x' = \frac{1}{x}$ $\quad \left(e^{f(x)}\right)' = e^{f(x)}\cdot f'(x)$