

University of Ottawa
Department of Mathematics and Statistics

MAT1339

Calculus and Vectors

Assignment 1, DUE Feb 5 in class, at the beginning of lecture

Winter 2019

Instructor: C. Rada

Study!

Last Name: _____

First Name: _____

Student Number: _____

NOT ALL EXERCISES WILL BE MARKED. ONLY SOME. SHOW ALL YOUR WORK (AS IN CLASS). USE THE BACKS OF PAGES IF NECESSARY.

1. [3 points] Find the derivatives of the following functions using the definition with LIMIT:
 $f(x) = \frac{-4}{x-2}$, $g(x) = 6x^2 - 6x - 8$, $h(x) = \sqrt{x+3} + 3$.

Hint: always start with:

$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$, THEN PLUG IN in THE TOP, THEN SIMPLIFY, THEN PASS TO LIMIT.

2. [4 points] Using Rules (Power, Product, and Quotient, Chain rule, etc) find the derivatives of:
 $f(x) = (x - x^9 + \frac{3}{x})^{78}$, $g(x) = \frac{3x^2+x^7}{(x+6)^3}$, $h(x) = (x - 5x^2)^2(x - x^2 + 666)^5$, $k(x) = \frac{(6x-3)^5}{1-4x-x^3}$. DO NOT simplify!

3. [3 points] Find the equation of tangent line to graph of the given function at the indicated point:

a) $f(x) = \frac{(x+1)^2}{x^2+1}, x = 1.$

b) $f(x) = 1 + \sqrt{4x} + x^2, x = 1.$

c) $f(x) = (x + x^2 + 2)(x - 1 + x^3), x = -1.$

Hint: always start by defining the equation you need to find: $y = mx + b$, then declare what the slope is: $m = f'(a)$, where a is given in statement. So, one needs to get by RULES $f'(x)$, and then plugin your a . To get b one must plug in a for x , and $f(a)$ for y .

In a), b) the value of a is 1, while in c) it is -1 .

4.

[2 points] Find the second derivative of $f(x) = \frac{x-7}{x^2}$. Simplify as much as possible.

5.

[2 points] Find the second derivative of $f(x) = \frac{(x-3)^2}{x+3}$. Simplify as much as possible.

6.

[1 point] Find the derivative of $f(x) = \frac{(3x-1)^6}{1+2x-x^8}$

Study!