Mathematics 1110H – Calculus I: Limits, Derivatives, and Integrals
TRENT UNIVERSITY, Fall 2018

Assignment #5
`Maple` Differentiates
Due on Friday, 19 October.

The focus of this assignment is to play a little with what *Maple* can do with taking and manipulating derivatives.

1. Use *Maple* to find all the points where the graph of $p(x) = 5x^5 + 4x^4 + 3x^3 + 2x^2 + x$ has slope 0, without taking the derivative of $p(x)$ by hand. *[2]*

2. Use *Maple* to help determine which of the points from **1** are maxima (peaks), minima (valleys), or neither of the graph of $p(x)$. *[2]*

A differential equation is an equation in which the derivative(s) of some unknown function(s) appear. The usual task is to find the unknown functions that satisfy the equation; this normally requires some additional information about specific values of the function(s) and/or the derivative(s) at specific points in order to fully pin down the unknowns.

Consider the differential equation $\dfrac{dy}{dx} = e^{x+y}$, with initial condition $y(0) = 0$ (*i.e.* with $y = 0$ when $x = 0$). A solution to this differential equation with the given initial condition would be a function $y = f(x)$ that satisfies both the equation, *i.e.* such that $f'(x) = e^{x+f(x)}$, and the given initial condition, *i.e.* such that $f(0) = 0$. `Maple` has ways of finding such solutions ...

3. Use `Maple` to find (all the) solution(s) of this differential equation with the given initial condition. Plot your solution(s) and figure out the(ir) domain and range. *[3]*

4. Use `Maple` to find (all the) solution(s) of this differential equation with the initial condition $y(0) = 1$ instead. Plot your solution(s) and figure out the(ir) domain and range. *[3]*