MATH299M/CMSC389W
Spring 2019 – Ajeet Gary, Devan Tamot, Vlad Dobrin
Model H4: Calculate Terms of Taylor Expansion
Assigned: February 18th, 2019
Due: March 4th, 2019 11:59PM

This week's assignment will be short and straightforward, since it's a part of Project 1. The objective is to create a model that calculates the Nth term of the Taylor Expansion of a function. There's a Mathematica function that will do this for you, but I want you to make it yourself; it's an instructive application of the computation tools from Lesson 4.

The N^{th} term in the *Taylor Expansion* of a function together with the preceding N terms (the "first" term is the 0^{th} term when N=0) makes the N^{th} order *Taylor Approximation* of a function. This is the N^{th} order polynomial that fits the function best. The full infinite sum is called a *Taylor Series.* Taylor Approximations are done around a *center*, denoted a, which is the point the approximation is around. When a=0 we call this a *Maclaurin Series*. This is what the n^{th} term of the Taylor expansion centered at a of a function f(x) is:

$$f^{(n)}(a)\frac{(x-a)^n}{n!}$$

Note that $f^{(n)}(a)$ is notation for $\frac{d^n f(a)}{dx^n}$.
Note that for $\frac{d^n f(a)}{dx^n}$ you take the n^{th} derivative of f wrt x first, then substitute x=a.

If you want a more thorough write-up of how the Taylor Expansion works, check out the Project 1 description!