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 Nth term in the Taylor Expansion of a function together with the preceding N terms (the "first" term is the 0th term when N=0) makes the Nth order Taylor Approximation of a function. This is the Nth 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 nth 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 nth 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!