MAT1575 Module 8 – Estimating function values using Taylor series.

Objectives: .

1. Let $f(x)$ be a function with n derivatives that exist at $x = c$. Give a formula for the Taylor polynomial of degree n of $f(x)$ centered at $x = c$.

2. Compute the following Taylor polynomials:

   (a) $f(x) = e^x$ centered at $x = 0$

   (b) $f(x) = \sin(x)$ centered at $x = 0$

   (c) $f(x) = \ln x$ centered at $x = 1$

3. Implement the Taylor polynomials above as python functions of two variables (x and n). Compare your numerical results for different values of x and n with the built-in python functions. You can find a basic skeleton of the program here: `https://trinket.io/python/d02151a7ce` (Hints: In python, $n\%2$ is 0 when n is even and 1 when n is odd. This will come in handy for $\sin(x)$. For $\ln(x)$, the polynomial approximation is only good in the interval $0 < x < 2$.)