Math 112
Chapter 11.11: Taylor Polynomials
(Applications of Taylor Series)

Use the Remainder estimate to the difference between $f(x) = \sin x$ and $T_3(x)$ for x in $[-\pi/2, \pi/2]$.

Use the Remainder estimate to the difference between $f(x) = \sin x$ and $T_5(x)$ for x in $[-\pi/2, \pi/2]$.

Find $T_3(x)$ for $f(x) = x \ln x$ at $a = 1$. Estimate the difference between $f(x)$ and $T_3(x)$ for $|x - 1| < 0.5$.

Find $T_3(x)$ for $\sqrt{x}$ at $a = 4$ and use it to estimate $\sqrt{4.3}$. Estimate the error in the approximation.

Write the Maclaurin series for $\text{Erf}(x) = \dfrac{2}{\sqrt{\pi}} \displaystyle\int_0^x e^{-t^2}\, dt$.

If we want to estimate Erf(0.8), how many terms of the series will we need to use?

Show that the function represented by the power series

$$J(x) = \sum_{n=0}^{\infty} \frac{(-1)^n x^{2n}}{2^{2n}(n!)^2}$$

is a solution to Bessel's equation $x^2 J''(x) + xJ'(x) + x^2 J(x) = 0$.

Find a Maclaurin series for the solution to the initial value problem

$$\begin{cases} y'(x) = 3y(x) \\ y(0) = 8 \end{cases}$$

(Let $y(x) = \sum_{0}^{\infty} c_n x^n$ and substitute it into the the problem to find c_n.)