Error Bound Examples

1. a. Find the fourth-order Maclaurin polynomial for $f(x) = e^x$

   b. Use the polynomial in part a to approximate *e*.

   c. Find the Lagrange Error Bound for your approximation on the interval [0, 1]

2. a. Use the fifth-order Maclaurin polynomial for $f(x) = \ln(1+x)$ to approximate ln(1.2).

   b. Estimate the error in your approximation using the Lagrange Error Bound

3. Estimate the error in approximating sin(-0.3) with a 3rd-degree Maclaurin polynomial using the Lagrange Error Bound. (Remember that you can use M = 1 for any trig function)

4. a. Use the second-degree Taylor polynomial for $f(x) = \sqrt{1+x}$ centered at x = 3 to approximate $\sqrt{4.2}$

   b. Estimate the error in your approximation using the Lagrange Error Bound on the interval [3, 3.4]

5. Suppose $f(1) = 8$, $f'(1) = 4$, $f''(1) = -2$, and $|f'''(x)| \le 10$ for all x in the domain of f.

   a. Approximate $f(1.4)$

   b. Estimate the error in your answer using the Lagrange Error Bound.

6. Suppose $f(0) = 2$, $f'(0) = -3$, $f''(0) = 4$, and $|f'''(x)| \le 2$ for all x in the interval $[-2,2]$.

   a. Approximate $f(-1)$.

   b. Prove that $f(-1) \neq 8.75$.