Homework 8

MATH 471
This assignment will not be graded.

1. Find the nth Taylor polynomial for

   (a) $f(x) = \ln(x)$, about $x_0 = 1$.

   (b) $f(x) = \frac{1}{1-x}$, about $x_0 = 0$.

2. Compute the third Taylor polynomial for the function

$$f(x) = \int_0^x \frac{1}{1+t^2} \mathrm{d}t$$

   about $x_0 = 0$.

3. Suppose that the function $f : \mathbb{R} \to \mathbb{R}$ has a second derivative and that

$$f''(x) + f(x) = e^{-x} \text{ for all } x,$$

   $f(0) = 0$, and $f'(0) = 2$. Find the fourth Taylor polynomial for f at $x_0 = 0$.

4. Prove that

$$1 + \frac{x}{3} - \frac{x^2}{9} < (1+x)^{1/3} < 1 + \frac{x}{3}$$

   for $x > 0$.

5. Find the Taylor polynomial at $x = 1$ for $f(x) = x^5 - x^3 + x$.