Fall 2005 Math 152

courtesy: Amy Austin
(covering section 10.7, 10.9)

Section 10.7

1. Find the Taylor Series for $f(x) = \frac{1}{x}$ at $x = 2$ and the associated interval of convergence.

2. Find the Taylor Series for $f(x) = e^{-2x}$ at $x = 1$.

3. Find the Maclaurin series for $f(x) = e^x$ and the associated interval of convergence.

4. Find the Maclaurin series for $f(x) = \sin x$ and the associated interval of convergence.

5. Use a known MacLaurin series derived in this section to obtain a Maclaurin Series for:

   a.) $f(x) = \cos(2x)$

   b.) $f(x) = x^2 e^{3x}$

   c.) $f(x) = \sin(x^2)$

6. Evaluate $\int \frac{\sin 2x}{x}\, dx$ as an infinite series.

7. Use series to approximate

$\int_0^{0.5} \cos(x^2)\, dx$ with error less than 10^{-3}.

Section 10.9

8. Find the third degree Taylor Polynomial for $f(x) = \sqrt{x}$ at $x = 4$.

9. Find the second degree Taylor Polynomial for $f(x) = \ln x$ at $x = 1$. Using Taylor's Inequality, find an upper bound on the remainder in using $T_2(x)$ to approximate $f(x) = \ln x$ for $0.5 \leq x \leq 2$.

10. Find the fourth degree Taylor Polynomial for $f(x) = \cos x$ at $x = \frac{\pi}{3}$. Using Taylor's Inequality, find an upper bound on the remainder is using $T_4(x)$ to approximate $f(x) = \cos x$ for $0 \leq x \leq \frac{2\pi}{3}$.