Spring 2009 Math 152

courtesy: Amy Austin
(covering section 10.7, 10.9, 11.1)

Section 10.7

1. Find the Taylor Series for $f(x) = \dfrac{1}{x}$ at $x = 3$ and the associated radius of convergence.

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

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

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

   a.) $f(x) = \cos(x^3)$

   b.) $f(x) = xe^{-x}$

   c.) $f(x) = \sin(\dfrac{x}{2})$

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

6. Use series to approximate
   $\displaystyle\int_0^{0.5} \cos(x^2)\,dx$ with error less than 10^{-3}.

Section 10.9

7. Find the third degree Taylor Polynomial for
   $f(x) = \sqrt{x}$ at $x = 1$.

8. Find the second degree Taylor Polynomial for $f(x) = \ln x$ at $x = 2$. Using Taylor's Inequality, find an upper bound on the remainder in using $T_2(x)$ to approximate $f(x) = \ln x$ for $1 \le x \le 3.2$.

9. What is the maximum error possible in using the approximation
   $\sin x \approx x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!}$ for $|x| < 0.3$?

Section 11.1

10. Find the distance between the points $P(1, 5, 3)$ and $Q(-2, 1, 2)$.

11. Find the equation of the sphere with radius 5 and center $(-1, 2, -5)$.

12. Find the center and radius of the sphere
    $x^2 + y^2 + z^2 = 6x - 4y + 10z$.

13. Describe the following region in R^3: $x^2 + y^2 \le 4$