Spring 2013 Math 152

Week in Review 7
courtesy: Amy Austin
(covering section 10.5-10.6)

Section 10.5

1. For the following power series, find the radius and interval of convergence.

   a.) $\sum_{n=0}^{\infty} \frac{n^2 x^n}{3^n}$

   b.) $\sum_{n=1}^{\infty} \frac{2^n (x-1)^n}{n^2+2}$

   c.) $\sum_{n=1}^{\infty} \frac{(-1)^n (2x+1)^n}{\sqrt{n}}$

   d.) $\sum_{n=0}^{\infty} \frac{n!(x+2)^{n-1}}{5^{n-1}}$

   e.) $\sum_{n=0}^{\infty} \frac{(-3)^n x^n}{(2n+1)!}$

2. Suppose it is known that $\sum_{n=0}^{\infty} c_n x^n$ converges when $x = -4$ and diverges when $x = 6$. On what interval(s) are we guaranteed convergence? On what interval(s) are we guaranteed divergence?

3. Suppose it is known that $\sum_{n=0}^{\infty} c_n (x-2)^n$ converges when $x = 5$ and diverges when $x = 12$. On what interval(s) are we guaranteed convergence? On what interval(s) are we guaranteed divergence?

Section 10.6

4. Express the following functions as a power series. Identify the radius and interval of convergence.

   a.) $f(x) = \frac{1}{1-x}$

   b.) $f(x) = \frac{1}{1-5x}$

   c.) $f(x) = \frac{-3}{1+4x^2}$

   d.) $f(x) = \frac{3x^2}{9-x}$

   e.) $f(x) = \ln(x+4)$

   f.) $f(x) = x\ln(x+4)$

   g.) $f(x) = \arctan(2x^3)$

   h.) $f(x) = \frac{1}{(1-2x)^2}$

5. Express $\int_0^{0.1} \frac{1}{1+x^5}\,dx$ as an infinite series. Use the sum of the first 3 terms of this series to approximate $\int_0^{0.1} \frac{1}{1+x^5}\,dx$. Estimate the error.