Week 11 Week in Review

courtesy: David J. Manuel

(covering 11.8 and 11.9)

(Problems with a * beside them will also be done in Python)

1 Section 11.8

1. Find the radius and interval of convergence of the following power series:

   (a) $\sum_{n=0}^{\infty} \frac{(x-3)^n}{5^n}$

   (b) $\sum_{n=0}^{\infty} \frac{(-1)^{n+1} x^{2n}}{(2n+1)!}$*

   (c) $\sum_{n=1}^{\infty} \frac{(x-2)^n}{n3^n}$

   (d) $\sum_{n=0}^{\infty} \frac{(-1)^n (x+3)^n}{2^n \sqrt{n^3+1}}$

   (e) $\sum_{n=1}^{\infty} \frac{(-1)^n (2x-1)^n}{\sqrt{n}}$*

   (f) $\sum_{n=0}^{\infty} \frac{(x+1)^n (2n+1)!}{10^n n!}$

   (g) $\sum_{n=0}^{\infty} \frac{x^n}{2e^n+5}$*

2. Suppose that $\sum_{n=0}^{\infty} c_n(x+1)^n$ converges when $x=2$ and diverges when $x=-5$.
   (a) Find all values of x for which you know the series converges.
   (b) Find all values of x for which you know the series diverges.

2 Section 11.9

1. Write a power series (centered at $a=0$) for the following functions
   (a) $f(x)=\ln(1+x)$
   (b) $f(x)=\dfrac{1}{9-4x^2}$
   (c) $f(x)=\dfrac{6x}{(1+3x^2)^2}$
2. Given $y=\sum_{n=0}^{\infty} c_n x^n$, the expression $y''+xy'+y$ can be written in the form $C_0+\sum_{n=1}^{\infty} C_n x^n$, where the C_k terms depend on n and c_j for different values of j. Find an expression for C_0 and C_n.