Homework 11: Sequences and Series (due April 6)

1. (Integral Test) Determine if the following series converges or diverges:

$$\sum_{n=2}^{\infty} \frac{1}{n \ln(n)}$$

2. Use the alternating series test to show that each of the following series converge:

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{(2n+1)}$

(b) $\displaystyle\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\sqrt[3]{n}e^n}$

3. Find a power series that converges to $\dfrac{1}{1+2x}$ and give its interval of convergence. (Hint: Geo. Series)

4. Find a power series that converges to $\dfrac{1}{1+y^2}$ and find its interval of convergence. (Hint: Geo. Series)

5. Find the interval convergence for the following power series (you don't need to worry about convergence at the endpoints):

(a) $\displaystyle\sum_{n=1}^{\infty} \frac{(5x)^{2n}}{\sqrt{n}}$

(b) $\displaystyle\sum_{n=2}^{\infty} \frac{(-1)^n (x-5)^n}{2^n n^2}$

(c) $\displaystyle x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$

(d) $\displaystyle 1 - \frac{(x+2)^2}{2!} + \frac{(x+2)^4}{4!} - \frac{(x+2)^6}{6!} + \cdots$