Math 217, Spring 2013
Assignment 6

1. For each of the following, determine if the series is convergent. If it is convergent, find the its sum. Show all your work.

   (a)

$$\sum_{n=1}^{\infty} \frac{n-1}{3n-1}$$

   (b)

$$\sum_{n=1}^{\infty} \frac{1+2^n}{3^n}$$

2. Find the partial sums s_n for the following series and check if the series is convergent or divergent by finding $\lim_{n\to\infty} s_n$. If the series is convergent, then find its sum.

   (a)

$$\sum_{n=2}^{\infty} \frac{2}{n^2-1}$$

   (b)

$$\sum_{n=1}^{\infty} \ln \frac{n}{n+1}$$

3. Determine whether the series is convergent or divergent.

   (a)

$$\sum_{n=1}^{\infty} \frac{n+1}{n\sqrt{n}}$$

(b)

$$\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2+1}}$$

(c)

$$\sum_{n=1}^{\infty} \frac{1+4^n}{1+3^n}$$

(d)

$$\sum_{n=1}^{\infty} \frac{1}{n!}$$

4. Determine whether the series is convergent or divergent.

   (a)

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

   (b)

$$\sum_{n=1}^{\infty} \frac{(-1)^{n-1}}{\ln n+4}$$

   (c)

$$\sum_{n=1}^{\infty} (-1)^{n-1} e^{2/n}$$

   (d)

$$\sum_{n=1}^{\infty} (-1)^n \frac{n^n}{n!}$$

5. Determine whether the series is absolutely convergent, conditionally convergent, or divergent.

(a)

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

(b)

$$\sum_{n=1}^{\infty} \frac{n}{5^n}$$

(c)

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

(d)

$$\sum_{n=1}^{\infty} (-1)^n \cos \frac{1}{n}$$

6. Find the radius of convergence and the interval of convergence of the following power series.

(a)

$$\sum_{n=1}^{\infty} (-1)^n n x^n$$

(b)

$$\sum_{n=1}^{\infty} \frac{x^n}{n!}$$

(c)

$$\sum_{n=1}^{\infty} (-1)^n \frac{x^n}{4^n \ln n}$$

(d)

$$\sum_{n=1}^{\infty} n!(2x-1)^n$$

7. Find a power series representation of the following functions and determine the interval of convergence of the series.

(a)

$$y = \frac{1}{x+10}$$

(b)

$$y = \frac{x}{2x^2+1}$$

(c)

$$y = \frac{x+2}{2x^2-x-1}$$

(d)

$$y = x^2 \tan^{-1}(x^3)$$

(e)

$$y = \frac{x^2+x}{(1-x)^3}$$

(f)

$$y = \left(\frac{x}{2-x}\right)^3$$

(g)

$$y = \ln\left(\frac{1+x}{1-x}\right)$$