Interval of Convergence Review
Multivariable Calculus

1. Determine the interval of convergence for $\sum_{n=1}^{\infty} \frac{(-1)^n (x-2)^n}{n}$

2. Determine the interval of convergence for $\sum_{n=1}^{\infty} \frac{n! x^n}{n^{10}}$

3. Consider the power series $\sum_{n=1}^{\infty} \frac{(x+2)^n}{3^n n}$

   a. At which x-value is the interval of convergence centered for the power series above?

   b. The radius of convergence for the series above is 3. Find the interval of convergence for the power series.

4. Consider

$$\sum_{n=1}^{\infty} \frac{n}{4^n(n+1)} x^{2n}$$

   a. Does the series converge for $x = 2$? Justify your answer.

   b. Based only on your answer from part *a*, what can you say about R, the radius of convergence of the series?

5. Consider

$$\sum_{n=1}^{\infty} \frac{1}{n5^n}(x-4)^{n+1}$$

   a. Find the radius of convergence of the power series.

   b. For which values of x does the series converge absolutely? For which values of x does it converge conditionally?

6. Consider

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

   a. Does the series converge or diverge at $x = 3$?

   b. What does your answer from part (a) imply about the radius of convergence of the series?

   c. Find the interval of convergence of the power series.

7. You are given that the power series $\sum_{n=0}^{\infty} C_n(x+3)^n$ converges when $x = -6$ and diverges when $x = 1$. Write an inequality that represents the value R could be. (R represents the radius of convergence).

8. Determine the interval of convergence of $\sum_{n=1}^{\infty} \frac{(-1)^n (x-5)^{4n}}{n^5 (16)^n}$

9. The power series $\sum_{n=0}^{\infty} \frac{(n+2)x^n}{n^4+1}$ has radius of convergence 1. Determine the interval of convergence of this power series.