

## MA 114 Worksheet # 7: Ratio and Root Test & Power Series

1. (a) State the Root Test.  
(b) State the Ratio Test.
2. Determine whether the series is convergent or divergent.

(a)  $\sum_{n=0}^{\infty} \left( \frac{3n^3 + 2n}{4n^3 + 1} \right)^n$

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

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

3. Identify the following statements as true or false. If the statement is true, cite evidence from the text to support it. If the statement is false, correct it so that it is a true statement from the text.

(a) To apply the Ratio Test to the series  $\sum_{n=1}^{\infty} a_n$  you should compute  $\lim_{n \rightarrow \infty} \frac{|a_{n+1}|}{|a_n|}$ . If this limit is less than 1 then the series converges absolutely.

(b) To apply the Root Test to the series  $\sum_{n=1}^{\infty} a_n$  you should compute  $\lim_{n \rightarrow \infty} \sqrt[n]{|a_n|}$ . If this limit is 1 or larger then the series diverges.

4. Give the definition of the radius of convergence of a power series  $\sum_{n=0}^{\infty} a_n x^n$

5. Find the radius and interval of convergence for  $\sum_{n=0}^{\infty} \frac{(-1)^n n}{4^n} (x - 3)^n$ .

6. Find the radius and interval of convergence for  $4 \sum_{n=0}^{\infty} \frac{2^n}{n} (4x - 8)^n$ .

7. Find the radius and interval of convergence for  $\sum_{n=0}^{\infty} \frac{x^{2n}}{(-3)^n}$ .

8. Find the radius and interval of convergence for  $\sum_{n=0}^{\infty} n!(x - 2)^n$ .