READING ASSIGNMENT 15

§11.5 (Ratio and Root Tests)

NAME: SOLUTIONS

Due 30 July 2018

LEARNING OBJECTIVES

By the end of this lesson, you will be able to:

- test for convergence of series using the ratio and the root tests.

REVIEW

- Review factorials and exponent laws.

READING

- Read §11.5 in the textbook. Pay special attention to the section on determining which test to apply.

QUESTIONS

(1) Fill in the blanks in the statement of the ratio test and root test.

Ratio Test. Assume that $\rho = \lim_{n\to\infty} \left|\frac{a_{n+1}}{a_n}\right|$ exists. Then

- If $\rho < 1$, then $\sum_{n=0}^{\infty} a_n$ converges absolutely [1].
- If $\rho > 1$, then $\sum_{n=0}^{\infty} a_n$ diverges [2].
- If $\rho = 1$, then the test is inconclusive [3].

Root Test. Assume that $L = \lim_{n\to\infty} \sqrt[n]{|a_n|}$ exists. Then

- If $L < 1$ [4], then $\sum_{n=0}^{\infty} a_n$ converges absolutelyc.
- If $L > 1$ [5], then $\sum_{n=0}^{\infty} a_n$ diverges.
- If $L = 1$ [6], then the test is inconclusive.

(2) Simplify the following expresssion: $\dfrac{(n+2)!}{n!}$

SOLUTION:

$$\frac{(n+2)!}{n!} = \frac{(n+2)(n+1)n!}{n!} = (n+2)(n+1)$$

(3) Which test should you try instead if the root test or the ratio test is inconclusive?

SOLUTION: Most of the time, the integral test will help in this situation, but there are other possible answers too.