§11.5 (RATIO AND ROOT TESTS) NAME: _____

26 July 2018

THE TESTS

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

(a) converges absolutely when [ ](1)

(b) diverges when [ ](2)

(c) inconclusive if [ ](3)

Root Test: Assume that $L = \lim_{n\to\infty} \sqrt[n]{|a_n|}$ exists. Then the series $\sum_{n=1}^{\infty} a_n$

(a) converges absolutely if [ ](4)

(b) diverges if [ ](5)

(c) inconclusive if [ ](6)

PROBLEMS

(1) Apply the ratio test or the root test to determine the convergence or divergence of the following series, or state that the test is inconclusive. If the test is inconclusive, apply another test to determine convergence or divergence, if possible.

(a) $\sum_{n=1}^{\infty} \frac{(-1)^{n-1} n}{5^n}$

(b) $\sum_{n=1}^{\infty} \frac{3n+2}{5n^3+1}$

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

(d) $\sum_{n=0}^{\infty} \frac{1}{10^n}$

(e) $\sum_{k=0}^{\infty} \left(\frac{k}{k+10}\right)^k$

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

(g) $\sum_{n=1}^{\infty} a_n$ where $a_0 = 1$, $a_{n+1} = \frac{a_n}{n}$