

MAT 222 - 001
Fall 2007
Test Two

Determine whether each of the following series (# 1 – 12) is **absolutely convergent**, **conditionally convergent**, or **diverges**. If the series is a convergent geometric series, find its sum. State the test you are using and show all details of the test. Always verify the conditions needed for the test to be valid.

1.
$$\sum_{k=1}^{\infty} \frac{k^2}{2^k}$$

2.
$$\sum_{k=2}^{\infty} \frac{k}{k^2 - k}$$

3.
$$\sum_{k=0}^{\infty} (-1)^k \frac{k!}{4^k}$$

4.
$$\sum_{k=2}^{\infty} \frac{1}{k (\ln k)^2}$$

5.
$$\sum_{k=2}^{\infty} \frac{(-1)^k}{k \ln k}$$

$$6. \cos\left(\frac{1}{2}\right) + \cos\left(\frac{1}{3}\right) + \cos\left(\frac{1}{4}\right) + \dots$$

$$7. \sum_{k=3}^{\infty} 7\left(-\frac{3}{4}\right)^k$$

$$8. \sum_{k=1}^{\infty} \frac{\cos\left(\frac{1}{k}\right)}{k^2}$$

$$9. \sum_{k=3}^{\infty} \frac{3k+5}{k(k-1)(k-2)}$$

$$10. \sum_{k=1}^{\infty} \frac{4}{k! + 4^k}$$

$$11. \sum_{k=1}^{\infty} \left(\frac{k}{2k+3}\right)^k$$

$$12. \sum_{k=1}^{\infty} \frac{(-1)^k}{\sqrt{k^2+1}}$$

13. Determine the interval of convergence of the power series

$$\sum_{k=1}^{\infty} \frac{(-1)^k}{k} (x-5)^k$$

14. Determine the interval of convergence of the power series

$$\sum_{k=1}^{\infty} \frac{(-5)^k (x-3)^k}{k^2}$$