

King Fahd University of Petroleum & Minerals
Department of Mathematical Sciences
Second Semester (20042), 2004 – 2005
Math-102, Quiz-5

Section:

ID Number:

Name:

1. Prove that a geometric series

$$\sum_{k=0}^{+\infty} ar^k = a + ar + ar^2 + ar^3 + \dots + ar^k + \dots \quad (a \neq 0)$$

converges if $|r| < 1$ and diverges if $|r| \geq 1$. If the series converges, then the sum is

$$\sum_{k=0}^{+\infty} ar^k = \frac{a}{1-r}$$

2. Determine whether the series

$$\sum_{k=1}^{+\infty} \frac{1}{k(k+1)} = \frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \dots + \frac{1}{k(k+1)} + \dots$$

converges or diverges. If converges, find the sum.

3. Prove that harmonic series

$$\sum_{k=1}^{\infty} \frac{1}{k} = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{k} + \dots$$

diverge.