

B.Sc IIIrd Sem - 2018

Assignment- Real Analysis

Last date of Submission: 30/09/2018

MM: 10

Q1. Exhibit a bijective function between \mathbb{N} (set of Natural numbers) and a proper subset of itself.

Q2. Prove the divergence of Harmonic series $\sum_{n=1}^{\infty} \frac{1}{n}$ in three different ways. Why is it called harmonic series?

Q3. The great Swiss mathematician Leonhard Euler reached incorrect conclusions in his pioneering work on the infinite series $1 - 1 + 1 - 1 + \dots = \frac{1}{2}$

by substituting $x = -1$ in the formula $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots$

What was the problem with his reasoning?

Q4. A ball is dropped from a height of 10 m. Each time it strikes the ground it bounces vertically to a height that is $\frac{2}{3}$ of the preceding height. Find the total distance the ball will travel if it is assumed to bounce infinitely often.

Q5. Show that the sequence $\left\{\frac{10^n}{n!}\right\}$ converges and find its limit.

Books suggested:

- 1) "Introduction to Real Analysis" by R.G Bartle and Donald R. Sherbert 4th edition.
- 2) "Calculus" by Howard Anton 10th edition.
- 3) "Calculus" Volume 1 by T M Apostol.
- 4) "Mathematical analysis" by T M Apostol.

Note: Student will have to give the detail of the references for each question.

Submitted to:

Name of Teacher:

Designation: Assistant Professor.