

MA 16020 Lesson 17: Geometric series II

Recall (geometric series):

A geometric series is a series of the form:

The series converges if and only if:

In that case, the sum of the series is:

Exercise 1. Write

$$\frac{49}{25} - \frac{7}{5} + 1 - \frac{5}{7} + \frac{25}{49} + \dots$$

in a compact form, and find its sum.

Exercise 2. Compute

$$\sum_{n=2}^{\infty} \frac{2}{3^{2n}}.$$

Exercise 3. A forest restoration organization plants 100 new trees each year. At the same time, it is expected that each year, 8% of all growing trees die due to various causes. Assuming that this effort goes on indefinitely, what is the expected eventual number of trees in the forest right after a round of re-planting? [Round to the nearest integer.]

Exercise 4. A falling ball upon hitting the ground bounces back to 30% of the height where the fall started. Initially, the ball was dropped from the height 20 m. If the ball keeps bouncing indefinitely, find the overall distance that the ball travels.

Exercise 5. An investment fund has annual interest rate 6.6%, compounded continuously. We would like to invest certain amount so that three years from now, we may start annual withdrawals \$3000 indefinitely. How much do we need to invest?