EE106 – Engineering Mathematics I

Problem Set 1

Due in tutorial on Thursday, 9 October 2014

1. Identify the following three series as either *arithmetic*, *geometric* or *neither arithmetic nor geometric*:

   (a) $4000 + 4023 + 4046 + 4069 + \ldots + 4230$

   (b) $0.1 + 0.12 + 0.123 + 0.1234 + \ldots$

   (c) $12.3 + 1.23 + 0.123 + 0.0123 + \ldots$

2. Write down any finite geometric series with six terms and compute its sum.

3. Write down any infinite *convergent* geometric series (preferably one we haven't already seen in lecture or tutorial), and compute its sum.

4. The total resistance of n resistors $R_1, R_2, \ldots, R_n$ connected in series is

$$
\begin{aligned}
R_{\text{total}} \;&=\; R_1 + R_2 + \ldots + R_n \\
&=\; \sum_{i=1}^{n} R_i.
\end{aligned}
$$

   Suppose the ith resistance is given by the formula

$$
R_i \;=\; \frac{Z}{5^i}
$$

   where $Z = 3\,\Omega$; what is the total resistance of an *infinite* number of these resistors connected in series?