## Sequences \& Series (Q 5, Paper 1)

## 1999

5 (a) The $n$th term of a sequence is given by

$$
T_{n}=\frac{n}{n+1} .
$$

(i) Find $T_{2}$, the second term.
(ii) Show that $T_{2}+T_{3}>1$.
(b) The first two terms of a geometric series are $2+\frac{2}{3}+\ldots$
(i) Find $r$, the common ratio.
(ii) Write down the third and fourth terms of the series.
(iii) Show that $S_{6^{\prime}}$, the sum to 6 terms, is $3-\frac{1}{3^{5}}$.
(c) The $n$th term of a series is given by

$$
T_{n}=4 n+1 .
$$

(i) Write down, in terms of $n$, an expression for $T_{n-1}$, the ( $n-1$ )st. term.
(ii) Show that the series is arithmetic.
(iii) Find $S_{20}$, the sum of the first 20 terms of the series.

## Answers

5 (a) (i) $\frac{2}{3}$
(b) (i) $r=\frac{1}{3}$
(ii) $\frac{2}{9}, \frac{2}{27}$
(c) (i) $T_{n-1}=4 n-3$
(iii) 860

