Sequences 1 [41 marks]

1. [Maximum mark: 6] 19N.1.SL.TZ0.S_1

In an arithmetic sequence, $u_2 = 5$ and $u_3 = 11$.

(a) Find the common difference. [2]

(b) Find the first term. [2]

(c) Find the sum of the first 20 terms. [2]

2. [Maximum mark: 5] 19N.2.AHL.TZ0.H_1

A geometric sequence has $u_4 = -70$ and $u_7 = 8.75$. Find the second term of the sequence. [5]

3. [Maximum mark: 6] 24N.1.SL.TZ1.6

For a particular arithmetic sequence, $u_{10} = 14$ and $S_{25} = 200$.

Find the value of k such that $u_k = 0$. [6]

4. [Maximum mark: 14] 23M.1.SL.TZ1.8

Consider the arithmetic sequence $u_1, u_2, u_3, \ldots$.

The sum of the first n terms of this sequence is given by $S_n = n^2 + 4n$.

(a.i) Find the sum of the first five terms. [2]

(a.ii) Given that $S_6 = 60$, find u_6. [2]

(b) Find u_1. [2]

(c) Hence or otherwise, write an expression for u_n in terms of n. [3]

Consider a geometric sequence, v_n, where $v_2 = u_1$ and $v_4 = u_6$.

(d) Find the possible values of the common ratio, r. [3]

(e) Given that $v_{99} < 0$, find v_5. [2]

5. [Maximum mark: 5] 21M.1.SL.TZ1.3

Consider an arithmetic sequence where $u_8 = S_8 = 8$. Find the value of the first term, u_1, and the value of the common difference, d. [5]

6. [Maximum mark: 5] 21M.2.SL.TZ2.3

An arithmetic sequence has first term 60 and common difference -2.5.

(a) Given that the kth term of the sequence is zero, find the value of k. [2]

(b) Let S_n denote the sum of the first n terms of the sequence.

Find the maximum value of S_n. [3]