Name:
Result:

1. *(2 points)*

Consider the sequences defined recursively:

$$\begin{cases} a_1 = 4 \qquad \text{and} \qquad a_n = a_{n-1} + \frac{1}{2} b_{n-1} \\ \\ b_1 = 2 \qquad \text{and} \qquad b_n = b_{n-1} + \frac{1}{4} a_{n-1}, \qquad n \geq 2 \end{cases}$$

Find the smallest value of k, for which $b_k > 100$.

2. *(5 points)*

Consider an arithmetic sequence with $u_7 = 11$ and $u_{13} = 35$.

(a) Find u_1 and d.

(b) Find the number of terms of this sequence which are smaller than 123.

(c) Calculate $u_1 + u_3 + u_5 + ... + u_{23}$.

3. *(3 points)*

The sum of the first n terms of a sequence a_n is given by the formula $S_n = 3^n - n$. Find the first three terms of this sequence and hence show that it is **not** arithmetic.

4. *(3 points)*

$2x+1,\ x+2,\ 8-x$ are the first three terms of an arithmetic sequence. Find the sum of the first ten terms of this sequence.

5. *(3 points)*

$x-5,\ x+10,\ 8x$ are the first three terms of a geometric sequence. Find the possible values of x and the ratio of each of the resulting sequences.