SPTA
Higher Homework
Recurrence Relations (B)

1. Find the value of U_3 where the recurrence relation is given by $U_{n+1} = 0.25U_n + 3.5$ and $U_0 = 4$ **(2)**

2. A doctor administers 20ml of a drug to a patient each day. Over the same period it is estimated that 75% of the drug in the patient's bloodstream is removed. If the level in the bloodstream rises above 30ml, the drug becomes toxic.

(a) Write down a recurrence relation that describes this situation. **(1)**

(b) Find the limit and explain what it means in the context of the question. **(3)**

3. The numbers 100, 275 and 493.75 are three consecutive terms of the linear recurrence relation $U_n = aU_{n-1} + b$

(a) Find the values of a and b **(3)**

(b) Does this sequence tend to a limit? (Explain) **(1)**

4. A sequence is defined by the recurrence relation $U_{n+1} = (k-2)U_n + 5$ where $U_0 = 3$

For what values of k does this sequence have a limit as $n \to \infty$ **(1)**

5. A sequence is defined by $U_{n+1} = mU_n + 6$ and $U_0 = 2$, with $-1 < m < 1$
Find the value of m for which the sequence has a limit of 20. **(3)**

6. Two sequences defined by $U_{n+1} = kU_n + 2$ and $V_{n+1} = 0.5V_n + 3$ have the same limit.
Find the value of k. **(3)**