1. It is estimated that, in a country park during the summer months, the vole population increases by 12% each week. It is also estimated that predators kill 100 voles each week. If U_n represents the vole population at the beginning of a week find an expression for U_{n+1}.

2. A recurrence relation is defined by $U_{n+1} = 0.4U_n - 24$. Explain why this sequence has a limit as $n \to \infty$ and find the limit of this sequence.

3. A sequence is defined by the recurrence relation, $U_{n+1} = 0.3U_n + 6$
   If $U_2 = 8.7$ find the value of U_0.

4. The terms of a sequence satisfy $U_{n+1} = kU_n + 5$. Find the value of k which produces a sequence with a limit of 4.

5. In a marine tank the amount of salt in the water is crucial for the health of the fish. Recommended limits give a salt solution of between 41 and 55 grams per gallon (g/gallon)
   It is known that the strength of the salt solution decreases by 15% every day.
   To combat this, salt is added at the **end** of each day, effectively increasing the strength of the solution by 8 g/gallon, thus creating a closed system.

   To allow the plants to acclimatise the initial strength in the tank has to be 45 g/gallon.

   In the long term will the strength of the solution remain within safe limits? Give a reason for your answer.

6. A sequence of numbers is defined by the recurrence relation $U_{n+1} = k\,U_n + c$, where k and c are constants.

   (a) Given that $U_2 = 70$, $U_3 = 65$ and $U_4 = 62.5$, find **algebraically**, the values of k and c.

   (b) Hence find the limit of this sequence.

   (c) Express the difference between the fifth term and the limit of the sequence as a percentage of the limit, correct to the nearest percent.