Higher

Mathematics

Sequences

Examples

Contents

1 Introduction to Sequences A

Recurrence Relations

The value of an endowment policy increases at the rate of 5% per annum. The initial value is £7000.

(a) Write down a recurrence relation for the policy's value after n years.

(b) Calculate the value of the policy after 4 years.

2 Linear Recurrence Relations A

1. A patient is injected with 156 ml of a drug. Every 8 hours, 22% of the drug passes out of his bloodstream. To compensate, a further 25 ml dose is given every 8 hours.

   (a) Find a recurrence relation for the amount of drug in his bloodstream.

   (b) Calculate the amount of drug remaining after 24 hours.

2 Linear Recurrence Relations A

2. A sequence is defined by the recurrence relation $u_{n+1} = 0{\cdot}6u_n + 4$ with $u_0 = 7$.

   Calculate the value of u_3 and the smallest value of n for which $u_n > 9{\cdot}7$.

4 The Limit of a Sequence A

1. The deer population in a forest is estimated to drop by 7·3% each year. Each year, 20 deer are introduced to the forest. The initial deer population is 200.

   (a) How many deer will there be in the forest after 3 years?

   (b) What is the long term effect on the population?

4 The Limit of a Sequence A

2. A sequence is defined by the recurrence relation $u_{n+1} = ku_n + 2k$ and the first term is u_0.

   Given that the limit of the sequence is 27, find the value of k.

5 Finding a Recurrence Relation for a Sequence A

A sequence is defined by $u_{n+1} = au_n + b$ with $u_1 = 4$, $u_2 = 3{\cdot}6$ and $u_3 = 2{\cdot}04$.

Find the values of a and b.