

QQQ – Decision 2 – Chapter 7 – Recurrence Relations (Version 2)

Total Marks: 22

(22 = Platinum, 20 = Gold, 18 = Silver, 15 = Bronze)

1. The general solution of the second order recurrence relation

$$u_{n+2} + k_1 u_{n+1} + k_2 u_n = 0 \quad n \geq 0$$

is given by

$$u_n = (A + Bn)(-3)^n$$

where A and B are arbitrary non-zero constants.

(a) Find the value of k_1 and the value of k_2 (2)

Given that $u_0 = u_1 = 1$

(b) find the value of A and the value of B . (2)

(Total 4 marks)

Edexcel A2 June 2022 Q2

2. The complementary function for the second order recurrence relation

$$u_{n+2} + \alpha u_{n+1} + \beta u_n = 20(-3)^n \quad n \geq 0$$

is given by

$$u_n = A(2)^n + B(-1)^n$$

where A and B are arbitrary non-zero constants.

(a) Find the value of α and the value of β . (2)

Given that $2u_0 = u_1$ and $u_4 = 164$

(b) find the solution of this second order recurrence relation to obtain an expression for u_n in terms of n . (6)

(Total 8 marks)

Edexcel A2 October 2020 Q4

3. Peter sets up a savings plan. He makes an initial deposit of $\pounds D$ and then pays in $\pounds M$ at the end of each month.

The value of the savings plan, in pounds, is modelled by

$$u_{n+1} = 1.025 u_n + 1800$$

where $n \geq 0$ is an integer and u_n is the total value of the savings plan, in pounds, after n years.

(a) Calculate the value of M **(1)**

Given that the value of the savings plan after 1 year is $\pounds 6925$

(b) solve the recurrence relation for u_n **(5)**

(c) Determine the value of D **(1)**

(d) Hence determine, using algebra, the number of years it will take for the value of the savings plan to exceed $\pounds 20000$ **(3)**

(Total 10 marks)