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A LEVEL MATHS

(19) Recurrence Relations and Periodic Sequences

WORKING AT D/E

(1) $u_{n+1} = 4u_n - 1,\ u_1 = 3.$

(a) Find u_2, u_3 and u_4.

(b) Explain why the sequence is not arithmetic.

(c) Find

$$\sum_{r=1}^{5} u_r$$

(2) $u_{n+1} = -u_n,\ u_1 = 4.$

(a) Find u_2, u_3 and u_4.

(b) Name what type of sequence this is.

(c) Explain why

$$\sum_{r=1}^{2000} u_r = 0$$

WORKING AT B/C

(1) $u_n = \cos(90n^o)\ , n \geq 1$

(a) Show that the order of the sequence is 4

(b) Explain why

$$\sum_{r=1}^{4n+2} u_r = -1$$

(2) $u_{n+1} = (u_n)^2 - 1,\ u_1 = p,\ p > 0$

(a) Find and expression for u_2,

Given that

$$\sum_{r=1}^{2} u_r = 19$$

(b) Find the value of p

(3) $u_n = (-1)^n,\ n \geq 1$

(a) Show that the sequence is periodic and state its period.

(b) Write down the value of

$$\sum_{r=1}^{8001} u_r$$

WORKING AT A*/A

(1) A sequence is defined for $n \geq 2$ by the recurrence relation

$u_n = u_{n-1} - 3,\ u_1 = k,$

(a) Show that the sequence is arithmetic.

Given that $u_8 = -11$

(b) Find the value of k

(c) Evaluate

$$\sum_{r=1}^{40} u_r$$

(2) $u_n = \tan(180n^o) + \cos(180n^o)\ , n \geq 1$

Explain why

(a)

$$\sum_{r=1}^{2n} u_r = 0$$

(b)

$$\sum_{r=1}^{2n+1} u_r = -1$$