Sigma Notation.

For each series:

write out every term in the series

hence find the value of the sum.

(1, 2) $\sum_{r=1}^{5}(3r+1)$ (3, 4) $\sum_{r=1}^{6} 3r^2$ (5, 6) $\sum_{r=1}^{5}\sin(90r°)$

Recurrence Relations

Find the first four terms of the following recurrence relationships.

(7) $u_{n+1} = u_n + 3$, $u_1 = 1$

(8) $u_{n+1} = u_n - 5$, $u_1 = 9$

(9) $u_{n+1} = 2u_n + 1$, $u_1 = 2$

(10) $u_{n+1} = (u_n)^2 - 1$, $u_1 = 2$

Suggest possible recurrence relationships for the following sequences. (Remember to state the first term.)

(11) 20, 17, 14, 11, …

(12) 1, 2, 4, 8, …

(13) 1, −1, 1, −1, 1, …

(14) 3, 7, 15, 31, …

(15) 0, 1, 2, 5, 26, …

(16) 26, 14, 8, 5, 3.5, …

By writing down the first four terms or otherwise, find the recurrence formula that defines the following sequences:

(17) $u_n = 2n - 1$

(18) $u_n = 3n + 2$

(19) $u_n = n + 2$

(20) $u_n = n^2$

(21) $u_n = 3^n - 1$

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

$$u_{n+1} = pu_n + q, \quad u_1 = 2$$

Given that $u_2 = -1$ and $u_3 = 11$, find the values of p and q.

A sequence is given by

$$x_1 = 2$$

$$x_{n+1} = x_n(p - 3x_n)$$

where p is an integer.

(24) Show that $x_3 = -10p^2 + 132p - k$ State k

(25) Given that $x_3 = -288$ find the value of p.

(26) Hence find the value of x_4.

(29) $\sum_{r=1}^{5}(r^2 + k) = 65$ State k.

(30) $\sum_{r=1}^{3} pr^3 = 108$ State p

(31) $\sum_{r=5}^{6} ar^2 + br^3 = 1145$ State $\frac{b}{a}$

A sequence $a_1, a_2, a_3, \ldots$ is defined by

$$a_1 = k$$

$$a_{n+1} = 4a_n + 5$$

(27) Find a_3 in terms of k.

(28) Show that $\sum_{r=1}^{4} a_r$ is a multiple of p where p is a prime number

A $u_{n+1} = 2u_n, \; u_1 = 1$

B $u_{n+1} = \frac{1}{2}(u_n + 2), \; u_1 = 26$

C 1

D $4+7+10+13+16$

E $16k+25$

F $u_{n+1} = u_n + 2n+1, \; u_1 = 1$

G $u_{n+1} = -u_n, \; u_1 = 1$

H 2, 3, 8, 63

I 1, 4, 7, 10

J -4

K 432

L 2, 5, 11, 23

M 50

N 9, 4, −1, −6

O $u_{n+1} = u_n - 3, \; u_1 = 20$

P $u_{n+1} = 3u_n + 2, \; u_1 = 2$

Q $3+12+27+48+75+108$

R $u_{n+1} = (u_n)^2 + 1, \; u_1 = 0$

S 1.5

T $u_{n+1} = u_n + 1, \; u_1 = 3$

U $u_{n+1} = u_n + 2, \; u_1 = 1$

V 273

W $u_{n+1} = 2u_n + 1$

X 12

Y 2

Z $u_{n+1} = u_n + 3, \; u_1 = 5$

α $1+0+(-1)+0+1$

β 7

γ -252288

δ 5

ε 3