

Recurrence Relations

Generate the first five terms of each sequence:

- (a) $u_{n+1} = u_n - 3$ $u_1 = 41$
 (b) $u_{n+1} = 2u_n$ $u_1 = 6$
 (c) $u_{n+1} = 3u_n + 1$ $u_1 = 1$
 (d) $u_{n+1} = \frac{1}{2}u_n - 2$ $u_1 = 16$
 (e) $u_{n+1} = 10 - u_n$ $u_1 = 3$

- (a) 41, 38, 35, 32, 29
 (b) 6, 12, 24, 48, 96
 (c) 1, 4, 13, 40, 121
 (d) 16, 6, 1, -1.5, -2.75
 (e) 3, 7, 3, 7, 3

Generate the first five terms of each sequence.

- (a) $u_{n+1} = \frac{2+u_n}{3}$ $u_1 = 1$
 (b) $u_{n+1} = \frac{8}{u_n - 1}$ $u_1 = 3$
 (c) $u_{n+1} = 1.15u_n$ $u_1 = 200$
 (d) $u_{n+1} = 5 + u_n^2$ $u_1 = -2$

- (a) 1, 1, 1, 1, 1
 (b) 3, 4, $\frac{8}{3}$, $\frac{24}{5}$, $\frac{40}{19}$
 (c) 200, 230, 264.5, 304.175, 349.80125
 (d) -2, 9, 86, 7401, 54774806

Write each of these sequences using a recurrence formula.

- (a) 12, 10, 8, 6, 4, ...
 (b) -3, 1, 5, 9, 13, ...
 (c) 2, 20, 200, 2000, 20000, ...

- (a) $u_{n+1} = u_n - 2$, $u_1 = 12$
 (b) $u_{n+1} = u_n + 4$, $u_1 = -3$
 (c) $u_{n+1} = 10u_n$, $u_1 = 2$

Generate u_3 , u_4 and u_5 for each of these recurrence relations.

- (a) $u_{n+2} = u_{n+1} + u_n$
 where $u_1 = 1, u_2 = 2$
 (b) $u_{n+2} = 3u_{n+1} - u_n$
 where $u_1 = -5, u_2 = -1$
 (c) $u_{n+2} = \frac{u_{n+1} + u_n}{2}$
 where $u_1 = 6, u_2 = 4$

- (a) $u_3 = 3$, $u_4 = 5$, $u_5 = 8$
 (b) $u_3 = 2$, $u_4 = 7$, $u_5 = 19$
 (c) $u_3 = 5$, $u_4 = \frac{9}{2}$, $u_5 = \frac{19}{4}$

(a) A sequence is defined by the formula $u_{n+1} = 5a - 2u_n$ $u_1 = a$
 Find the first five terms of the sequence, giving your answers in their simplest form.

(b) Given that the sequence 3, 11, 27, 59, ... can be defined by the formula $u_{n+1} = au_n + b$, find the values of a and b .

- (a) $a, 3a, -a, 7a, -9a$
 (b) $u_2 = au_1 + b$ $11 = 3a + b$
 $u_3 = au_2 + b$ $27 = 11a + b$
 Subtract $16 = 8a$ $a = 2$
 $b = 5$