14.2 Practice

Find the next three terms in each sequence. Then, tell if the sequence converges or diverges.

1) $2,\ 6,\ 18,\ 54,\ 162, \ldots$

486, 1458, 4374
(diverges)

2) $-1,\ 2,\ 7,\ 14,\ 23, \ldots$

34, 47, 62 (diverges)

I done messed up! ↻

3) $-3,\ 15,\ -75,\ 375,\ -1875, \ldots$

9375, -46875, 234375

4) ~~$2,\ 5,\ 10,\ 17,\ 26, \ldots$~~

1.11111, 1.111111, 1.1111111

converges to $1.\overline{1}$ or 10/9

Find the first four terms in each sequence, given the explicit formula.

5) $a_n = 5^{n-1}$

1, 5, 25, 125

6) $a_n = -12 + 30n$

18, 48, 78, 108

7) $a_n = n^2 - 1$

0, 3, 8, 15

8) $a_n = \dfrac{8}{n+2}$

$\dfrac{8}{3}, 2, \dfrac{8}{5}, \dfrac{4}{3}$

OR $\dfrac{8}{3}, \dfrac{8}{4}, \dfrac{8}{5}, \dfrac{8}{6}$

Find the first four terms in each sequence, given the recursive formula.

9) $a_n = a_{n-1} + \dfrac{3}{2}$

$a_1 = 0$

0, 3/2, 3, 9/2

10) $a_n = a_{n-1} \cdot -5$

$a_1 = -3$

-3, 15, -75, 375

11) $a_n = a_{n-1} \cdot 4$

$a_1 = 3$ 3, 12, 48, 192

12) $a_n = \dfrac{2 + a_{n-1}}{2}$

$a_1 = 10$

10, 6, 4, 3

Write the explicit formula for each sequence.

13) $4,\ 20,\ 100,\ 500,\ 2500, \ldots$

$a_n = 4 \times 5^{n-1}$

14) $29,\ 20,\ 11,\ 2,\ -7, \ldots$

$a_n = 38 - 9n$

15) $1, \frac{3}{2}, 2, \frac{5}{2}, 3, \ldots$

$a_n = \frac{1}{2}n + \frac{1}{2}$

16) $2, 5, 10, 17, 26, \ldots$

$a_n = n^2 + 1$

Write the recursive formula for each sequence.

$1\times3 \quad -2\times3 \quad 4\times3 \quad -6\times3 \quad 8\times3$

17) $3, -6, 12, -24, 48, \ldots$

$\boxed{a_n = 3(-2)^{n-1}}$

$a_1 = 3$

18) $-3, -\frac{3}{4}, -\frac{3}{16}, -\frac{3}{64}, -\frac{3}{256}, \ldots$

$a_n = \frac{a_{n-1}}{4} = \frac{1}{4}a_{n-1}$

$a_1 = -3$

19) $-4, -8, -16, -32, -64, \ldots$

$a_n = 2a_{n-1}$

$a_1 = -4$

20) $3, -\frac{3}{5}, \frac{3}{25}, -\frac{3}{125}, \frac{3}{625}, \ldots$

$a_n = \frac{a_{n-1}}{-5} = -\frac{1}{5}a_{n-1}$

$a_1 = 3$

Evaluate each series.

21) $\sum_{k=1}^{6} (3k^2 - 2)$

$[3(1)^2-2]+[3(2)^2-2]+[3(3)^2-2]+[3(4^2)-2]+[3(5^2)-2]+[3(6^2)-2]$

$= 1+10+25+46+73+106$

$\boxed{= 261}$

22) $\sum_{a=2}^{8} (20 - a)$ $(20-2)+(20-3)+\ldots+(20-8)$

$= 105$

23) $\sum_{k=1}^{6} k(k-2)$

$1(1-2)+2(2-2)+3(3-2)+4(4-2)+5(5-2)+6(6-2)$

$= 49$

24) $\sum_{k=4}^{9} k^2$ $= 4^2+5^2+6^2+7^2+8^2+9^2$

$= 271$

25) $\sum_{m=5}^{11} (40 - m)$

$(40-5)+(40-6)+(40-7)+(40-8)+(40-9)+(40-10)+(40-11)$

$= 224$

26) $\sum_{k=0}^{4} (3k^2 + 3)$ $= 3+6+15+30+51$

$= 105$

Rewrite each series using sigma notation. There are different ways to do each of these!

27) $4 + 16 + 64 + 256$

$\sum_{k=1}^{4} 4^k$

28) $1 + 4 + 9 + 16 + 25$

$\sum_{k=1}^{5} k^2$

29) $301 + 302 + 303 + 304 + 305 + 306$

$\sum_{k=301}^{306} k$ ← Plus many others!

30) $601 + 602 + 603 + 604$

$\sum_{k=1}^{4} k+600$