Write your questions and thoughts here!

Let's look at the following lists of numbers, often called_____.

1, 3, 5, 7, 9, 11, …

$a_1 =$_____

$a_2 =$_____

$a_{13} =$_____

$a_n =$_____

Converge or Diverge?

$0, \dfrac{1}{2}, \dfrac{2}{3}, \dfrac{3}{4}, \dfrac{4}{5}, \dfrac{5}{6}, …$

$a_1 =$_____

$a_2 =$_____

$a_{54} =$_____

$a_n =$_____

Converge or Diverge?

_____

$a_1 =$_____

$a_2 =$_____

$a_{100} =$_____

$a_n = (-3)^n$

Converge or Diverge?

You try!

6, 8, 10, 12, 14 …

$a_1 =$_____

$a_2 =$_____

$a_{19} =$_____

$a_n =$_____

Converge or Diverge?

_____

$a_1 =$_____

$a_2 =$_____

$a_{44} =$_____

$a_n = (-1)^{(n+1)}$

Converge or Diverge?

$-100, \ 10, \ -1, \ 0.1, -0.01, …$

$a_1 =$_____

$a_2 =$_____

$a_9 =$_____

$a_n =$_____

Converge or Diverge?

Sometimes, we define sequences based on a formula using pervious terms. These formulas are called _____.

Example: Find the first four terms of the sequence using the recursive formula that is given:

You try!

1. $a_n = 4a_{n-1} - 3$
     $a_1 = 2$

2. $a_n = \dfrac{1}{2}a_{n-1}$
     $a_1 = 16$

3. $a_n = n * a_{n-1}$
     $a_1 = 1$

A _____ is the sum of all of the terms of a sequence. So the

So the sequence *12, 15, 18, 21* would have the corresponding series *of* _____.

To help us write series compactly, we use _____.

$$\sum_{k=1}^{n} a_k$$

Example: Rewrite each series as a sum.   *You try!*

4. $\displaystyle\sum_{n=0}^{5} 4n$

5. $\displaystyle\sum_{p=1}^{4} p^p$

6. $\displaystyle\sum_{m=7}^{10} m(m+3)$

Example: Evaluate each series.   *You try!*

7. $\displaystyle\sum_{n=0}^{4} 3^n$

8. $\displaystyle\sum_{h=1}^{4} (-1)^{(h-1)} \frac{1}{h}$

9. $\displaystyle\sum_{k=4}^{7} \frac{k^2}{2}$

Example: Rewrite the series using sigma notation with *k = 0* and *k = 1*.   *You try!*

10. $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6}$

11. $1 - \frac{2}{3} + \frac{4}{9} - \frac{8}{27} + \frac{16}{81}$

Calculator? Mode: Change "Function to Sequence"

14.1 Practice

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

1) 2, 6, 18, 54, 162, ...

2) −1, 2, 7, 14, 23, ...

3) −3, 15, −75, 375, −1875, ...

4) 1, 1.1, 1.11, 1.111, ...

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

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

6) $a_n = -12 + 30n$

7) $a_n = n^2 - 1$

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

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

9) $a_n = a_{n-1} + \dfrac{3}{2}$
   $a_1 = 0$

10) $a_n = a_{n-1} \cdot -5$
    $a_1 = -3$

11) $a_n = a_{n-1} \cdot 4$
    $a_1 = 3$

12) $a_n = \dfrac{2 + a_{n-1}}{2}$
    $a_1 = 10$

Write the explicit formula for each sequence.

13) 4, 20, 100, 500, 2500, ...

14) 29, 20, 11, 2, −7, ...

15) $1, \dfrac{3}{2}, 2, \dfrac{5}{2}, 3, ...$

16) $2, 5, 10, 17, 26, ...$

Write the recursive formula for each sequence.

17) $3, -6, 12, -24, 48, ...$

18) $-3, -\dfrac{3}{4}, -\dfrac{3}{16}, -\dfrac{3}{64}, -\dfrac{3}{256}, ...$

19) $-4, -8, -16, -32, -64, ...$

20) $3, -\dfrac{3}{5}, \dfrac{3}{25}, -\dfrac{3}{125}, \dfrac{3}{625}, ...$

Evaluate each series.

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

22) $\displaystyle\sum_{a=2}^{8} \left(20 - a\right)$

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

24) $\displaystyle\sum_{k=4}^{9} k^2$

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

26) $\displaystyle\sum_{k=0}^{4} \left(3k^2 + 3\right)$

Rewrite each series using sigma notation.

27) $4 + 16 + 64 + 256$

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

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

30) $601 + 602 + 603 + 604$