

1, 2, 3, 4, ...

$$d = 1$$

-12, -15, -18, -21

$$d = -3$$

2, 4, 8, 16, ...

$$r = 2$$

$$\frac{1}{2}, \frac{3}{2}, \frac{9}{2}, \frac{27}{2}, \dots$$

~~$$\frac{1}{2} \cdot \frac{9}{2} = \frac{9}{4}$$

$$\frac{3}{2} \cdot \frac{3}{2} = \frac{9}{4}$$~~

~~$$\frac{27}{2} \cdot \frac{2}{9} = 3$$~~

~~$$\frac{9}{2} \cdot \frac{2}{3} = 3$$~~

Geo

$$a_n = a_1 r^{n-1}$$

$$a_n = r a_{n-1}$$

$$S_n = a_1 \left( \frac{1-r^n}{1-r} \right)$$

$$S = \frac{a_1}{1-r}, |r| < 1$$

① explicit formula

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

$$a_n = \frac{1}{2} \cdot \frac{3^n}{3^1}$$

$$a_n = \frac{1}{6} (3)^n$$

② recursive

$$r=3$$

$$a_n = 3a_{n-1}$$

$$\text{or } a_{n+1} = 3a_n$$

③  $a_{40}$

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

$$a_{40} = \frac{1}{2} (3)^{39}$$

Find sum of first 15 terms.

$$S_n = a_1 \left( \frac{1-r^n}{1-r} \right) \text{ 15th partial sum}$$

$$S_{15} = \frac{1}{2} \left( \frac{1-3^{15}}{1-3} \right)$$

$$S = \frac{a_1}{1-r}$$

$$|r| < 1$$

no  $\infty$

sum

$$|3| < 1$$

divergent

## Test Review

*25 multiple choice*

*formula sheet provided*

*Calculator active*

\*be able to do explicit rule/nth term for both arithmetic and geometric sequences

\*use and create a recursive formula

\*find finite and infinite sums

\*find a specific term

\*use sigma notation

\*divergence and convergence

# Sigma Notation

- a mathy way to write a sum

$$\sum_{n=1}^5 \text{explicit rule}$$

upper bound

lower bound

~~$$a_{n+1} + 3$$~~

$$\sum_{n=1}^5 3n - 6 = 15$$

$$a_1 = -3$$

$$a_2 = 0$$

$$a_3 = 3$$

$$a_4 = 6$$

$$a_5 = 9$$

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$$15$$

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on calc

2<sup>nd</sup>/STAT/MATH/5/2<sup>nd</sup>/STAT/OPS/5

sum(seq(explicit formula, X, beg, end

Ex Compute  $\sum_{k=1}^3 \frac{1}{k}$

A)  $\frac{1}{3}$  B)  $\frac{11}{6}$  C)  $\frac{3}{5}$  D)  $\frac{1}{2}$  E) 6

$$a_1 = 1 \quad a_2 = \frac{1}{2} \quad a_3 = \frac{1}{3}$$

$$1 + \frac{1}{2} + \frac{1}{3}$$

$$\frac{6+3+2}{6}$$

$$6$$

$$\frac{11}{6}$$

**B**

Ex Use summation notation to write this series. Then find sum.  
-1 + 2 + 5 + 8 + 11 + ... for 10 terms.  
 $a_1$   $a_2$   $a_3$   $a_4$   $a_5$

~~A.  $\sum_{n=1}^{10} (3n-1), 125$~~  ~~B.  $\sum_{n=1}^{10} (-1)(3)^{n-1}, 125$~~

$\textcircled{C.} \sum_{n=1}^{10} (3n-4), 125$  D.  $\sum_{n=1}^{10} (-3n-4), 125$

## Geometric Series

$$S_n = a_1 \left( \frac{1-r^n}{1-r} \right)$$

partial  
finite  
 $S_4$

## $\infty$ Sum

$$S = \frac{a_1}{1-r}, |r| < 1$$

convergent iff  $|r| < 1$

divergent if  $|r| \geq 1$

if  $|r| \geq 1$

Ex Determine whether the sequence converges or diverges. If it converges, give the limit.

$$60, 10, \frac{5}{3}, \frac{5}{18}, \dots \quad r = \frac{10}{60} = \frac{1}{6}$$

A. convg; 75540      C. convg; 0

B. convg; 72

~~D. diverges~~

$$S = \frac{60}{1 - \frac{1}{6}} = \frac{60}{\frac{5}{6}} = 60 \cdot \frac{6}{5} = 72$$



Ex Write the 1<sup>st</sup> 4 terms

$$a_1 = -4$$

$$a_n = a_{n-1} - 2$$

~~A. 4, 6, 8, 10~~

~~B. 4, 2, 0, -2~~

C. -4, -6, -8, -10

~~D. -4, -4, -2, 0~~

last term  
prev. term

-4

-6

$$a_{n+1} = a_n - 2$$

Ex 6, 2, -4, -6, -2, 4 can be  
found w/ what formula?  
*a<sub>1</sub> a<sub>2</sub>*

~~A)  $a_n = a_{n-2} - a_{n-1}$ ,  $a_1 = 6$ ,  $a_2 = 2$~~   
*2<sup>nd</sup> to last term - last term*

~~B)  $a_n = 6 + (n-1)4$~~

C)  $a_n = a_{n-1} - a_{n-2}$ ,  $a_1 = 6$ ,  $a_2 = 2$

d) None of above

1. Recursive Wksht

2. p.739

3. p.749

The review problems (Stations) are optional and will NOT be collected!