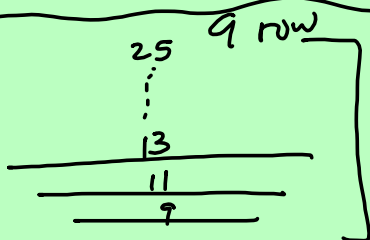


2/ Feb  
20 25 30. ....

$$S_n = \frac{n}{2} (a_1 + a_n)$$

$$S_n = \frac{11}{2} (20 + 70) \\ = \$495$$

$$a_n = a_1 + d(n-1) \\ = 20 + 5\left(\frac{11-1}{10}\right) \\ = 20 + 50 \\ = 70$$



$$a_9 = a_1 + d(n-1) \\ = 9 + 2(9-1) \\ = 25$$

$$S_n = \frac{n}{2} (a_1 + a_n) \\ = \frac{9}{2} (9 + 25) = 153 \text{ members}$$

# GEOMETRIC SEQUENCES

3, 12, 48, 192, . . . .

$r = \text{common ratio} = 4$

$$r = \frac{a_2}{a_1} = \frac{12}{3} = 4$$

multiply by the same value

81, 54, 36, 24, . . . .

$$r = \frac{54}{81} = \frac{2}{3}$$

$$r = \frac{24}{36} = \frac{2}{3}$$

5, -15, 45, -135, . . . .

$$r = -3$$

$a_1$   
 $a_2$   
 $a_3$   
 2, 6, 18, 54, . . . .  $r = 3$   
 $2 \cdot 3$   $2 \cdot 3^2$   $2 \cdot 3^3$   
 $2 \cdot 3^1$   $2 \cdot 3^2$   $2 \cdot 3^3$

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

Find  $a_8$ .

150, -60, 24, . . . .

$$r = \frac{-60}{150} = \frac{-2}{5} \text{ or } -0.4$$

$$a_8 = a_1 \cdot r^{n-1}$$

$$= 150 \cdot (-0.4)^{8-1}$$

$$= -0.24576$$

Population of Zeno, Ohio is decreasing by 8% per year. The population is currently 2100. What will it be in 7 years?

$$2100, \quad \underbrace{\hspace{1.5cm}} \\ * 0.92$$

Find 8<sup>th</sup> term.

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

$$a_8 = 2100 \cdot (0.92)^{8-1}$$

$$\approx 1171 \text{ people}$$

$$\begin{array}{r} 100\% \\ - 8\% \\ \hline 92\% \end{array}$$

Growing by 5%

$$\begin{array}{r} 100\% \\ + 5\% \\ \hline 105\% \end{array}$$

$$\approx 1.05$$

## Geometric Series

$$S_4 = 312$$

$$r = \frac{10}{2} = 5 \text{ or } \frac{50}{10} = 5$$

$$\begin{array}{r} | S_4 = 2 + 10 + 50 + 250 \\ - 5S_4 = 0 + 10 + 50 + 250 + 1250 \\ \hline \end{array}$$

$$-4S_4 = 2$$

$$-4S_4 = \frac{-1248}{-4}$$

$$S_4 = 312$$

$$-1250$$

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

Know last term

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r}$$

$$x^3 \cdot x^4 = x^7$$

$$= \frac{a_1 - a_1 \cdot r^{n-1} \cdot r}{1 - r}$$

Know number of terms

$$S_n = \frac{a_1 - a_1 r^n}{1 - r}$$

Find  $S_n$ .

$$6 + 24 + 96 + \dots + 6,291,456$$

Know last term

$$S_n = \frac{a_1 - a_n \cdot r}{1 - r} = \frac{6 - 6291456 \cdot 4}{1 - 4}$$

$$= 8,388,600$$

Know # of terms

$$200 - 25 + \frac{25}{8} - \dots - 10 \text{ terms.}$$

$$r = \frac{-25}{200} = -\frac{1}{8}$$

$$S_n = \frac{a_1 - a_n \cdot r^n}{1 - r} = \frac{200 - 200 \cdot \left(-\frac{1}{8}\right)^{10}}{1 - \left(-\frac{1}{8}\right)}$$

$$= \frac{2,982,616,175}{16,777,216}$$

((2982616175)/(16777216))

$$\approx 177.78$$



Find Sum.

$4 + 12 + 36 + 108 + \dots = \infty$   $r=3$   $|r| \geq 1$   
diverges

$4 + 2 + 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots = 8$  converges  
 $0 < |r| < 1$

$r = \frac{1}{2}$

$$S_n = \frac{a_1 - a_1 \cdot r^n}{1 - r} = \frac{4 - 4 \cdot \left(\frac{1}{2}\right)^\infty}{1 - \frac{1}{2}} = \frac{4}{1 - \frac{1}{2}} = \frac{4 \cdot \frac{2}{1}}{\frac{1}{2}} = 8$$

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