

Ex 10.4

④ c) $36, 18, 9, \dots, \frac{9}{128}$

$a = 36$

$r = \frac{18}{36} = \frac{1}{2}$

$t_n = \frac{9}{128}$

$t_n = ar^{n-1}$

$\frac{9}{128} = \frac{36}{256} \left(\frac{1}{2}\right)^{n-1}$

$\frac{1}{512} = \left(\frac{1}{2}\right)^{n-1}$

$\left(\frac{1}{2}\right)^9 = \left(\frac{1}{2}\right)^{n-1}$

$\frac{\log\left(\frac{1}{512}\right)}{\log\left(\frac{1}{2}\right)}$

$9 = n - 1$

$10 = n$

⑤ d) $2^{50}, 2^{48}, 2^{46}, \dots$

$a = 2^{50}$

$r = \frac{2^{48}}{2^{50}} = 2^{48-50} = 2^{-2}$

$t_{15} = (2^{50})(2^{-2})^{14}$

$t_{15} = (2^{50})(2^{-28})$

$t_{15} = 2^{22}$

⑥ $t_3 = \frac{1}{9} \quad | \quad t_1 = 9$

$t_3 = ar^{3-1} \quad | \quad t_1 = ar^{1-1}$

$t_3 = ar^2 \quad | \quad t_1 = ar^0$

$ar^2 = \frac{1}{9} \quad | \quad ar^0 = 9$

$ar^0 = 9$
 $ar^2 = \frac{1}{9}$
 $r^4 = 81$

$r = \pm 3$

$ar^2 = \frac{1}{9}$

$a(3)^2 = \frac{1}{9}$

$9a = \frac{1}{9}$

$a = \frac{1}{81}$

$\frac{1}{81}, \pm \frac{1}{27}, \frac{1}{9}, \pm \frac{1}{3}$

$t_4 = \pm \frac{1}{3}$

Arithmetic Series

Series: The sum of the terms of a sequence. The sum is usually finite: $1+2+3+4+5$. However it could be infinite: $2+4+8+16+\dots$. You can find the sum of many finite series and certain types of infinite series by using formulas.

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$S_n = \frac{n}{2}(a + t_n)$$

Ex: $2+5+8+11+14$

$$t_5 = \underline{15}$$

$$S_5 = 40$$



Sum of the first five terms

$$t_4 = 11$$

$$S_4 = 26$$

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Find the sum of the first 100 terms of the arithmetic series $1+4+7+10+\dots$

$$a = 1$$

$$d = t_2 - t_1 = 3$$

$$n = 100$$

$$S_n = \frac{n}{2}(2a + (n-1)d)$$

$$S_{100} = \frac{100}{2}[2(1) + (100-1)3]$$

$$S_{100} = 50(2 + 297)$$

$$S_{100} = 50(299)$$

$$S_{100} = 14950$$

Find the sum of the following series

$$\frac{1}{2} + 1 + \frac{3}{2} + 2, \dots + 20$$

Hint: How many terms are there?

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

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

$$t_n = 20$$

$$n =$$

$$t_n = a + (n-1)d$$

$$20 = \frac{1}{2} + (n-1)\left(\frac{1}{2}\right)$$

$$20 = \cancel{\frac{1}{2}} + \frac{n}{2} - \cancel{\frac{1}{2}}$$

$$20 = \frac{n}{2}$$

$$40 = n$$

$$S_n = \frac{n}{2}(a + t_n)$$

$$S_{40} = \frac{40}{2}\left(\frac{1}{2} + 20\right)$$

$$S_{40} = \cancel{20} \left(\frac{41}{2}\right)$$

$$S_{40} = 410$$

How many terms are in the series:
 $3+8+13+\dots+248$ if its sum is 6275?

$$a = 3$$

$$d = 5$$

$$S_n = 6275$$

$$t_n = 248$$

$$S_n = \frac{n}{2}(a + t_n)$$

$$6275 = \frac{n}{2}(3 + 248)$$

$$6275 = \frac{251n}{2}$$

$$12550 = 251n$$

$$\boxed{50 = n}$$

Find the indicated sums of the following series:

S_{15} of $2+6+10\dots$

$$a=2$$

$$d=4$$

$$n=15$$

$$S_{15} = \frac{15}{2} [2(2) + (15-1)4]$$

$$= \frac{15}{2} (4 + 56)$$

$$= \frac{15}{2} (60)$$

$$= 450$$

S_{20} of $-15-10-5+\dots$

$$a=-15$$

$$d=5$$

$$n=20$$

$$S_{20} = \frac{20}{2} [2(-15) + (20-1)5]$$

$$= 10 (-30 + 95)$$

$$= 10 (65)$$

$$= 650$$

Homework

#1-8

