Questions from Homework

⑥ Given:
$d = 3$
$t_{13} = 25$
$S_{13} = ?$

① Find a:
$t_n = a + (n-1)d$
$t_{13} = a + (13-1)(3)$
$25 = a + 36$ -36 -36
$-11 = a$

② Find S_n
$S_n = \frac{n}{2}(a + t_n)$
$S_{13} = \frac{13}{2}(-11 + 25)$
$S_{13} = \frac{13}{2}(14)^7$
$S_{13} = 91$

⑦ Given:
$t_2 = -1$ | $t_{12} = 19$

$t_2 = a + (2-1)d$
$t_2 = a + d$
$-1 = a + d$
$a + d = -1$

$t_{12} = a + (12-1)d$
$t_{12} = a + 11d$
$19 = a + 11d$
$a + 11d = 19$

Elimination by subtraction

$a + 11d = 19$
$(-)\ a + d = -1$
$10d = 20$
$\frac{10d}{10} = \frac{20}{10}$
$d = 2$

$a + d = -1$
$a + 2 = -1$ -2 -2
$a = -3$

$S_{13} = \frac{13}{2}[2(-3) + (13-1)(2)]$
$S_{13} = \frac{13}{2}[-6 + 24]$
$S_{13} = \frac{13}{2}(18)^9$
$S_{13} = 117$

⑧ Given:
$t_{12} = 15$
$t_{12} = a + (12-1)d$
$t_{12} = a + 11d$
$a + 11d = 15$

$S_{15} = 105$
$S_{15} = \frac{15}{2}[2a + (15-1)d]$
$S_{15} = \frac{15}{2}(2a + 14d)$
$105 = 15a + 105d$
$15a + 105d = 105$ $\div 15$
$a + 7d = 7$

Elimination

$a + 11d = 15$
$(-)\ a + 7d = 7$
$4d = 8$
$\frac{4d}{4} = \frac{8}{4}$
$d = 2$

$a + 7d = 7$
$a + 7(2) = 7$
$a + 14 = 7$ -14 -14
$a = -7$

$t_1 = -7$
$t_2 = -5$
$t_3 = -3$
$-7 - 5 - 3 - 1 + 1 + 3 + 5 \ldots$

Geometric Series

A Geometirc Series is the sum of the terms of a finite Geometric Sequence. (Remember geometric sequences have a common ratio, $r = t_2 \div t_1$)

$2+6+18+54+162+486.$

3 3 3 3 3

$t_4 = 54$

$S_4 = 80$

To find the sum of a geometric series we use the following formula:

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Try solving the series above!

Geometric Series

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Find the indicated sum for the following series:

$S_7 = 1+3+9+...$

a = 1
r = 3
n = 7

$S_7 = \frac{(1)[(3)^7 - 1]}{3-1}$

$S_7 = \frac{1(2187-1)}{2}$

$S_7 = \frac{2186}{2} = 1093$

$S_8 = 8-4+2-1+...$ (-½ -½ -½)

a = 8
r = -½
n = 8

$S_n = \frac{a(r^n - 1)}{r-1}$

$S_8 = \frac{(8)[(-\frac{1}{2})^8 - 1]}{-\frac{1}{2} - 1}$

$S_8 = \frac{8\left(\frac{1}{256} - \frac{1}{1}\right)}{-\frac{1}{2} - \frac{1}{1}}$

$S_8 = \frac{8\left(\frac{1}{256} - \frac{256}{256}\right)}{-\frac{1}{2} - \frac{2}{2}}$

$S_8 = 8\left(-\frac{255}{256}\right) \div -\frac{3}{2}$

$S_8 = 8\left(-\frac{255}{256}\right)\left(-\frac{2}{3}\right)$

$S_8 = \frac{4080}{768} = \frac{85}{16}$

Geometric Series

$$S_n = \frac{a(r^n - 1)}{r - 1}$$

Find the sum of the following series:

$2 + 4 + 8 + \ldots 1024$

$a = 2$

$r = 2$

$t_n = 1024$

$n =$

$S_n =$

① Find n

$t_n = ar^{n-1}$

$\frac{1024}{2} = \frac{(2)(2)^{n-1}}{2}$

$512 = (2)^{n-1}$

$(2)^9 = (2)^{n-1}$

$\log 512 = 9$

$\log 2$

$9 = n - 1$

$+1 \quad +1$

$10 = n$

② Find S_{10}

$S_{10} = \frac{(2)[(2)^{10} - 1]}{2 - 1}$

$S_{10} = \frac{2(1024 - 1)}{1}$

$S_{10} = 2046$

Homework

Do #1 - 8
Omit #4

#1 Do not find S_n