Geometric Series Continued...

Ex. 1: Find S_{12}: $18 - 9 + 4.5 - \ldots$

$t_1 = 18$

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

$n = 12$

$$S_n = \frac{t_1(r^n - 1)}{r - 1}$$

$$S_{12} = \frac{18\left(\left(-\frac{1}{2}\right)^{12} - 1\right)}{-\frac{1}{2} - 1}$$

$$S_{12} = \frac{18\left(\frac{1}{4096} - \frac{4096}{4096}\right)}{-\frac{3}{2}}$$

$$S_{12} = 18\left(\frac{-4095}{4096}\right) \div \left(-\frac{3}{2}\right)$$

$$S_{12} = \frac{(\cancel{18}^{\,6})(-4095)}{\cancel{4096}_{\,2048}} \times \left(-\frac{\cancel{2}^{\,1}}{\cancel{3}_{\,1}}\right)$$

$$S_{12} = \frac{\cancel{6}^{\,3}(4095)}{\cancel{2048}_{\,1024}}$$

$$\boxed{S_{12} = \frac{12285}{1024}}$$

Ex. 2: Find the sum: $\frac{1}{3}+\frac{2}{9}+\frac{4}{27}+\ldots+\frac{128}{6561}$

$t_1=\frac{1}{3}$

$r=\frac{2}{9}\div\frac{1}{3}=\frac{2}{\cancel{9}_{3}}\times\frac{\cancel{3}^{1}}{1}=\left(\frac{2}{3}\right)$

$t_n=\frac{128}{6561}$

$S_n=\frac{r(t_n)-t_1}{r-1}$

$S_n=\frac{\left(\frac{2}{3}\right)\left(\frac{128}{6561}\right)-\frac{1}{3}}{\frac{2}{3}-1}$

$S_n=\frac{\frac{256}{19683}-\frac{6561}{19683}}{-\frac{1}{3}}$

$S_n=\frac{-6305}{19683}\div\left(-\frac{1}{3}\right)$

$S_n=\frac{+6305}{\cancel{19683}_{6561}}\cdot+\frac{\cancel{3}^{1}}{1}$

$\boxed{S_n=\frac{6305}{6561}}$

≈ 0.96

Ex. 3: If $S_7 = 27305$, and $r = 4$, find t_1.

$n = 7$

$$S_n = \frac{t_1(r^n - 1)}{r - 1}$$

$$27305 = \frac{t_1((4)^7 - 1)}{4 - 1}$$

$$27305 = \frac{t_1(\cancel{16383}^{5461})}{\cancel{3}_1}$$

$$\frac{27305}{5461} = \frac{t_1(\cancel{5461})}{\cancel{5461}}$$

$$\boxed{5 = t_1}$$

p.53–54

#2d, 4d, 5, 9, 10