

$$\begin{aligned}
 &= \frac{1}{1-k} (r - rk + r^2 - r^2k + r^3 - r^3k + \dots \text{to } n \text{ terms}) \\
 &= \frac{1}{1-k} ((r + r^2 + r^3 + \dots \text{to } n \text{ terms}) - (rk + r^2k + r^3k + \dots \text{to } n \text{ terms})) \\
 &= \frac{1}{1-k} \left(\frac{r(r^n - 1)}{r - 1} - \frac{rk(r^n - 1)}{rk - 1} \right) \\
 &= \frac{r}{1-k} \left(\frac{r^n - 1}{r - 1} - \frac{k(r^n - 1)}{rk - 1} \right) \quad \text{Answer}
 \end{aligned}$$

Q No 4 $2 + (1-i) + \frac{1}{2} + \dots$ to 8 terms

$$a_1 = 2, \quad r = \frac{1-i}{2}; \quad n = 8$$

$$\begin{aligned}
 \text{Now } S_n &= \frac{a_1(r^n - 1)}{r - 1} \\
 &= \frac{2 \left(\left(\frac{1-i}{2} \right)^8 - 1 \right)}{\frac{1-i}{2} - 1} \\
 &= \frac{2 \left(\frac{(1-i)^8}{2^8} - 1 \right)}{\frac{1-i-2}{2}} \\
 &= 4 \left(\frac{((1-i)^2)^4 - 1}{256} \right) \\
 &= 4 \left(\frac{(1-2i+i^2)^4 - 1}{256} \right) \\
 &= 4 \left(\frac{(1-2i-1)^4 - 1}{256} \right) \\
 &= \frac{64(-1-i)^4 - 256}{64(-1-i)} \quad \left| \begin{array}{l} z^4 = (z^2)^2 \\ z^2 = (-i)^2 \\ = (-1)^2 \\ = 1 \end{array} \right. \\
 &= \frac{16(1) - 256}{64(-1-i)} = \frac{-240}{64(-1-i)} \\
 &= \frac{-15}{-4(1+i)} = \frac{15}{4(1+i)} \cdot \frac{1-i}{1-i} \\
 &= \frac{15(1-i)}{4((1)^2 - (i)^2)} = \frac{15(1-i)}{4(2)} = \frac{15(1-i)}{8} \quad \text{Answer}
 \end{aligned}$$

Q No 5 i) $\frac{1}{5} + \frac{1}{25} + \frac{1}{125} + \dots$

$$a_1 = \frac{1}{5}, \quad r = \frac{1}{5}$$

$$\begin{aligned}
 \text{Now } S &= \frac{a_1}{1-r} = \frac{\frac{1}{5}}{1-\frac{1}{5}} \\
 &= \frac{\frac{1}{5}}{\frac{4}{5}} = \frac{1}{4} \quad \text{Answer}
 \end{aligned}$$

ii) & iii) Do yourself

iv) $2 + 1 + 0.5 + \dots$

$$a_1 = 2, \quad r = \frac{1}{2} = 0.5$$

$$\begin{aligned}
 \text{Now } S &= \frac{a_1}{1-r} = \frac{2}{1-0.5} \\
 &= \frac{2}{0.5} = 4 \quad \text{Answer}
 \end{aligned}$$

v) $4 + 2\sqrt{2} + 2 + \sqrt{2} + 1 + \dots$

$$a_1 = 4, \quad r = \frac{2\sqrt{2}}{4} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$$

$$\begin{aligned}
 \text{Now } S &= \frac{a_1}{1-r} = \frac{4}{1-\frac{1}{\sqrt{2}}} \\
 &= \frac{4}{\frac{\sqrt{2}-1}{\sqrt{2}}} = \frac{4\sqrt{2}}{\sqrt{2}-1} \quad \text{Answer OR} \\
 &= \frac{4\sqrt{2} \cdot \sqrt{2}+1}{\sqrt{2}-1 \cdot \sqrt{2}+1} \\
 &= \frac{4((\sqrt{2})^2 + \sqrt{2})}{2-1} = 4(2+\sqrt{2}) \quad \text{Answer}
 \end{aligned}$$

vi) Do yourself

Q No 6 i) $1.\dot{3}\dot{4}$

$$= 1.343434 \dots$$

$$= 1 + 0.343434 \dots$$

$$= 1 + (0.34 + 0.0034 + 0.000034 + \dots)$$

$$a_1 = 0.34, \quad r = \frac{0.0034}{0.34} = 0.01$$

$$= 1 + \frac{0.34}{1-0.01} = 1 + \frac{0.34}{0.99} = 1 + \frac{34}{99}$$

$$= \frac{99+34}{99} = \frac{133}{99} \quad \text{Answer}$$