

1) Geometric progression
 $a, ar, ar^2, ar^3, \dots, ar^n$

①

log each term

$$\log a, \log(ar) = \log a + \log r$$

$$\log(ar^2) = \log a + \log r^2 = \log a + 2 \log r$$

$$\log(ar^n) = \log a + \log r^n = \log a + n \log r$$

which is arithmetic with
term $\log a$ and common difference
 $\log r$ P.T.O for b) }

$$2) x = \frac{-n \pm \sqrt{n^2 - 4}}{2}$$

$$= -n \left(\frac{1 \pm \sqrt{1 - 4/n^2}}{2} \right)$$

$$= -n \left(\frac{1 \pm (1 - 2/n^2 + \text{higher order terms})}{2} \right)$$

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

or $-n \left(\frac{1 + 1 - 2/n^2}{2} \right) = -n + \frac{1}{n}$