

Exam Review: Sequences and Series

1a) $-2, 1, 4, 7, \dots$ b) $5, -10, 15, -20, \dots$ c) $-3, 12, -48, 192, \dots$

arithmetic

neither

geometric

$$\begin{aligned} a &= -2 \\ d &= t_2 - t_1 \\ d &= 1 - (-2) \\ d &= 3 \end{aligned}$$

$$\begin{aligned} a &= -3 \\ r &= \frac{t_2}{t_1} = \frac{12}{-3} = -4 \end{aligned}$$

2. $7, 10, 13, 16, \dots$

$$\begin{aligned} \text{a) } a &= 7 \\ d &= 3 \\ t_n &= a + (n-1)d \\ &= 7 + (n-1)3 \\ &= 7 + 3n - 3 \\ t_n &= 3n + 4 \end{aligned}$$

$$\begin{aligned} \text{b) set } n &= 25 \\ t_{25} &= 3(25) + 4 \\ &= 75 + 4 \\ &= 79 \end{aligned}$$

$$\begin{aligned} \text{c) } S_n &= \frac{n[2a + (n-1)d]}{2} \\ S_{25} &= \frac{25[2(7) + (25-1)3]}{2} \\ &= \frac{25[14 + 24(3)]}{2} \\ &= \frac{25[86]}{2} \\ &= \frac{2150}{2} \\ &= 1075 \end{aligned}$$

3. $3, 6, 12, 24$

$$\begin{aligned} \text{a) } a &= 3 \\ r &= \frac{t_2}{t_1} = \frac{6}{3} = 2 \\ t_n &= ar^{n-1} \\ t_n &= 3(2)^{n-1} \end{aligned}$$

$$\begin{aligned} \text{b) set } n &= 12 \\ t_{12} &= 3(2)^{12-1} \\ &= 3(2)^{11} \\ &= 3(2048) \\ t_{12} &= 6144 \end{aligned}$$

$$\begin{aligned} \text{c) } S_n &= \frac{a(r^n - 1)}{r - 1} \\ &= \frac{3(2^{12} - 1)}{2 - 1} \\ &= 3(4095) \\ S_{12} &= 12285 \end{aligned}$$

$$4. \quad t_1 = 1, \quad t_2 = 3, \quad t_n = 2t_{n-1} - t_{n-2}$$

$$\begin{aligned} t_3 &= 2t_{3-1} - t_{3-2} \\ &= 2t_2 - t_1 \\ &= 2(3) - 1 \\ &= 6 - 1 \end{aligned}$$

$$t_3 = 5$$

$$\begin{aligned} t_4 &= 2t_{4-1} - t_{4-2} \\ &= 2t_3 - t_2 \\ &= 2(5) - 3 \\ &= 10 - 3 \end{aligned}$$

$$t_4 = 7$$

$$\begin{aligned} t_5 &= 2t_{5-1} - t_{5-2} \\ &= 2t_4 - t_3 \\ &= 2(7) - 5 \\ &= 14 - 5 \end{aligned}$$

$$t_5 = 9$$

\therefore The first 5 terms are $1, 3, 5, 7$ and 9 .

$$5. a) \quad 9, 7, 5, 3, 1, \dots$$

$$t_1 = 9, \quad t_n = t_{n-1} - 2, \quad n > 1$$

$$b) \quad 5, 10, 20, 40, 80, \dots$$

$$t_1 = 5, \quad t_n = 2t_{n-1}, \quad n > 1$$