

## April Midterm review

## Arithmetic and Power Sequences

- For the following data: State the type of function (linear (*arithmetic*), quadratic, cubic)
  - 13, 26, 55, 106, 185, 298 . . .
  - 16, 32, 58, 94, 140 . . .
- Find the equation for the following sequence - 2, 16, 42, 76, 118, 168, . . .
- Find the first 3 terms of the sequences.
  - $t_n = 2(n^2 + n - 1)$
  - $t_n = -3n^2 - 2n + 4$
- If the arithmetic sequence rule is  $t_n = t_1 + (n - 1)d$  and the following sequence is given - 5, - 2, 1, 4, 7 . . .
  - Find the equation
  - Find the 50<sup>th</sup> term
  - What is the slope?
- How many terms are in the following sequence: 3, 8, 13, 18, . . . . 103
- In an arithmetic sequence , the first term is 7 and the 20<sup>th</sup> term is 64.
  - Find the sequence in the form  $t_n = t_1 + (n - 1)d$
  - Find the 200<sup>th</sup> term in the sequence.



3(a)  $t_1, t_2, t_3$  of  $t_n = 2(n^2 + n - 1)$

$$\begin{aligned} t_1 &= 2(n^2 + n - 1) \\ &= 2((1)^2 + (1) - 1) \\ &= 2(1 + 1 - 1) \\ &= 2(1) \\ &= 2 \end{aligned}$$

$$\begin{aligned} t_2 &= 2(n^2 + n - 1) \\ &= 2((2)^2 + (2) - 1) \\ &= 2(4 + 2 - 1) \\ &= 2(5) \\ &= 10 \end{aligned}$$

$$\begin{aligned} t_3 &= 2(n^2 + n - 1) \\ &= 2((3)^2 + (3) - 1) \\ &= 2(9 + 3 - 1) \\ &= 2(11) \\ &= 22 \end{aligned}$$

$t_1, t_2, t_3$
2, 10, 22

3(b)  $t_1, t_2, t_3$  of  $t_n = -3n^2 - 2n + 4$

$$\begin{aligned} t_1 &= -3n^2 - 2n + 4 \\ &= -3(1)^2 - 2(1) + 4 \\ &= -3 - 2 + 4 \end{aligned}$$

$$t_1 = -1$$

$$\begin{aligned} t_2 &= -3n^2 - 2n + 4 \\ &= -3(2)^2 - 2(2) + 4 \\ &= -3(4) - 4 + 4 \end{aligned}$$

$$t_2 = -12$$

$$\begin{aligned} t_3 &= -3n^2 - 2n + 4 \\ &= -3(3)^2 - 2(3) + 4 \\ &= -3(9) - 6 + 4 \\ &= -27 - 6 + 4 \end{aligned}$$

$$t_3 = -29$$

$t_1, t_2, t_3$
-1, -12, -29

4. -5, -2, 1, 4, 7

$d, \quad \underbrace{\quad}_3 \quad \underbrace{\quad}_3 \quad \underbrace{\quad}_3 \quad \underbrace{\quad}_3$

$$\begin{aligned} a &= -5 \\ d &= 3 \\ t_n &= a + d(n-1) \\ &= -5 + 3(n-1) \\ &= -5 + 3n - 3 \end{aligned}$$

$$t_n = 3n - 8$$

$$\begin{aligned} t_{50} &= 3n - 8 \\ &= 3(50) - 8 \\ &= 150 - 8 \end{aligned}$$

$$t_{50} = 142$$

$$\text{slope} = d = 3$$

$$5. \quad \begin{array}{cccccc} t_1 & t_2 & t_3 & t_4 & & t_n \\ 3, & 8, & 13, & 18, & \dots & 103 \end{array}$$

$$\begin{aligned} a &= 3 \\ d &= 5 \\ t_n &= a + d(n-1) \\ &= 3 + 5(n-1) \\ &= 3 + 5n - 5 \\ t_n &= 5n - 2 \end{aligned}$$

$$\begin{aligned} t_n &= 103 \\ t_n &= 5n - 2 \\ \therefore 5n - 2 &= 103 \\ 5n &= 105 \\ n &= 21 \end{aligned}$$

21 terms in the sequence

$$6. \quad t_1, \dots, t_{20} \Rightarrow a = 7$$

$$(a) \quad 7, \quad 64 \quad d = 3$$

Step 1 find 'd'

$$\begin{aligned} d \text{ is slope} \\ \text{slope} &= \frac{\Delta y}{\Delta x} = \frac{\Delta t_n}{\Delta \text{value}} \end{aligned}$$

$$\frac{64-7}{20-1} = \frac{57}{19} = 3$$

Step 2 write equation

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

(b) Term 200

$$\begin{aligned} t_{200} &= 3n + 4 \\ &= 3(200) + 4 \\ &= 600 + 4 \\ &= 604 \end{aligned}$$