Determine the 1st and 2nd differences for each quadratic shown.

$y = 3x^2$

x	y	1st	2nd
-2	12		
-1	3	-9	6
0	0	-3	6
1	3	3	6
2	12	9	6
3	27	15	

$y = -2x^2 + 5$

x	y	1st	2nd
-2	-3		
-1	3	6	-4
0	5	2	-4
1	3	-2	-4
2	-3	-6	-4
3	-13	-10	

The value of the second differences in a quadratic Relation is double the Coefficient of x^2

Solve a System of linear Equations

Solve the following system of equations

$2x + y = 7$ ① plug $x=3$ into ②

$x + y = 4$ ②

Solve by elimination

$3+y=4$

$\boxed{y=1}$

$$\begin{array}{r} 2x + y = 7 \\ -\quad x + y = 4 \\ \hline x + 0 = 3 \end{array}$$

$\boxed{x=3}$

∴ The solution is $(3,1)$

4

-3

plug

$14-9$

$-9=$

$9=$

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6.1

Chapter 6
Discrete Functions

Sequences as Discrete Functions

Sequences

Add the next 2 terms to each sequence of numbers:

3, 5, 7, 9... , 11 , 13

2, 4, 8... , 16 , 32

27, 9, 3... , 1 , $\frac{1}{3}$ ✓

1, 1, 2, 3, 5... 8 , 13 , 21 , 34 , 55 , ...

Sequences

A sequence consists of terms:

eg. 3, 5, 7, 9..., 11, 13, 15

The first term~~s~~ is 3 which is written as $t_1 = 3$

Similarly $t_3 =$ 7

And

$t_7 =$ 15

Explicit Formulas

A sequence is defined by the formula:

$t_n = 2n - 1$, where $n \in N$ and t_n represents the nth term

↳ is in the set of Natural numbers. (whole numbers).

a) Determine the first 4 terms of the sequence

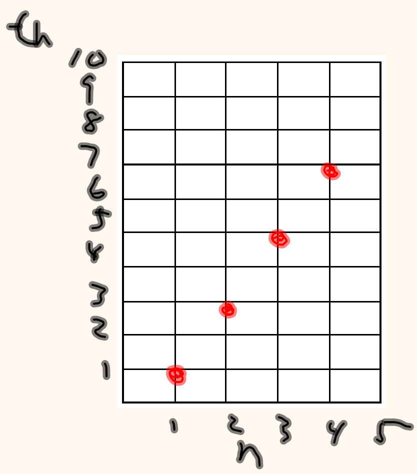
$t_1 = 2(1) - 1$
$= 1$

$t_2 = 2(2) - 1$
$= 3$

$t_3 = 5$

$t_4 = 7$

b) Graph the sequence



c) State the domain and range

$D: \{ n \in N \mid n \geq 0 \}$

$R: \{ t_n \in N \mid t_n \geq -1 \}$

Explicit Formulas

Determine the first 4 terms of the sequence defined by the formula:

$$t_n = \frac{n+1}{n}$$

$t_1 = 2$

$t_2 = \frac{3}{2}$

$t_3 = \frac{4}{3}$

$t_4 = \frac{5}{4}$

$R: \{t_n \in \mathbb{R} \mid t_n \geq 2\}$

Finding a Formula

Eg. Determine the formula that would generate the sequence:

4, 7, 10, 13...

n	t_n	1st diff
1	4	
2	7	3
3	10	3
4	13	3

This pattern is Linear.

Since this is Linear the equation must be ($y=mx+b$)

$t_n = mn + b$

$\boxed{t_n = 3n + 1}$

Finding a Formula

Eg. Determine the formula that would generate the sequence 1, 10, 25, 46... by first creating a table of values and calculating the finite differences.

$\boxed{y=ax^2+bx+c}$

n	t_n	1st diff	2nd diff
1	1	/	/
2	10	9	/
3	25	15	6
4	46	21	6

* In a quadratic Relation, the a-value is half the 2nd difference value.

$\boxed{t_n=3n^2+bn+c}$

Take (1,1) and sub in.

$1=3(1)^2+b(1)+c$

$1=3+b+c$

$\boxed{-2=b+c}$ (1)

Take (2,10) and sub in

$10=3(2)^2+b(2)+c$

$10=12+2b+c$

$\boxed{-2=2b+c}$ (2)

Solve:

$$\begin{array}{rl} & -2=b+c \\ - & -2=2b+c \\ \hline & 0=-b+0 \end{array} \Rightarrow b=0$$

plug $b=0$ into (2)

$-2=2(0)+c$

$\boxed{-2=c}$

$\boxed{t_n=3n^2-2}$

Homework:

pg 360 # (1 - 4)ace, 7, 8, ~~13~~

all 4