Mathematical Induction

Lesson 9.4 – Finite Differences

Determine if the sequence is arithmetic. If so, write the n^{th} term formula.

{114, 106, 98, 90, …}

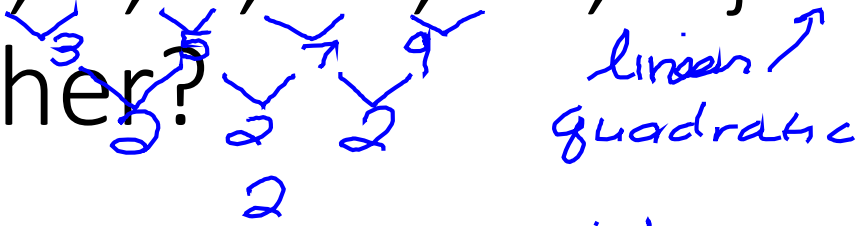
yes it's arithmetic

−8 −8 −8

$a_n = -8n + 122$

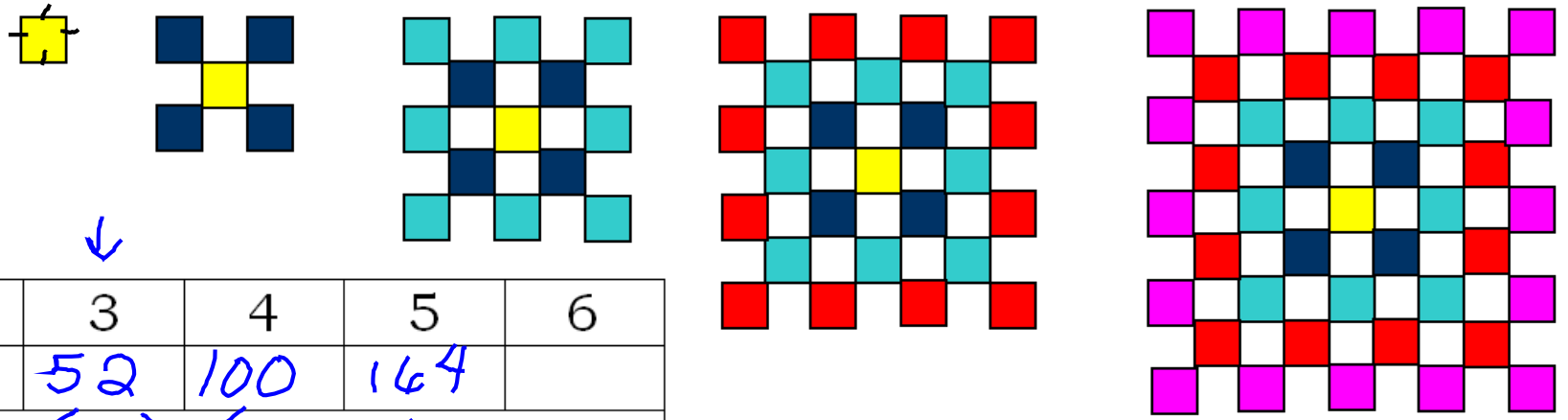
$a_1 = 114$ $a_{n+1} = a_n - 8$

Is {1, 4, 9, 16, 25, …} arithmetic, geometric, or neither?



$a_n = n^2$ neither (quadratic)

Find a model for the sequence based on the pattern below.



N	1	2	3	4	5	6
Number of edges	4	20	52	100	164	

16 32 48 64

16 16 16

$a_n = 8n^2 - 8n + 4$

ax^2+bx+c

an^2+bn+c

$a_1 = a(1)^2+b(1)+c = 4$

$\rightarrow a+b+c=4 \leftarrow 8-8+c=4$

$c=4$

$a_2 = a(2)^2+b(2)+c = 20$

$\rightarrow 4a+2b+c=20$

$a_3 = a(3)^2+b(3)+c = 52$

$\Rightarrow 9a+3b+c=52$

$a_3-a_2 \Rightarrow 5a+b=32$

$a_2-a_1 \Rightarrow 3a+b=16$

$2a=16$

$a=8$

$3(8)+b=16$

$24+b=16$

$-24 \quad -24$

$b=-8$

Find a model for the sequence

$n=1$

{5, 10, 17, 26, 37, 50}.

5 7 9 11 13

2 2 2 2

quadratic

$a_n = n^2 + 2n - 2$

$a_n = an^2 + bn + c$

$a_1 = a + b + c = 5$

$a_2 = 4a + 2b + c = 10$

$a_3 = 9a + 3b + c = 17$

$5a + b = 7$ $(a_3 - a_2)$

$-3a - b = -5$ $(a_1 - a_2)$

$2a = 2$

$a = 1$

$5(1) + b = 7$

$b = 2$

$1 + 2 + c = 5$

$c = 2$

Find a model for the sequence {0, 4, 10, 18, 28}

Section 9.4 p. 643: 55-60

Section 9.4

Quadratic Models Day 2

Find a quadratic model for the sequence with the indicated terms. $a_0 = -2$, $a_1 = 1$, $a_3 = 13$

Find a quadratic model for the sequence with the indicated terms. $a_1 = -5$, $a_2 = -5$, $a_3 = -3$

Section 9.4; 69, 70, 73, 74