UNIT 10 *Sequences*

Overhead Slides

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OS 10.1

Constant Differences

Use the differences to extend each sequence:

A   3   10   17   24   31   ....

      ....

B   1   9   17   25   33   ....

      ....

C   5   8   11   14   17   ....

      ....

D   90   79   68   57   46   ....

      ....

OS 10.2   *Sequences Defined by Formulae*

A sequence is defined by the formula $u_n = 5n - 3$

$$u_1 \quad = \quad 5 \times 1 - 3$$

$$= $$

$$u_2 \quad = \quad 5 \times \ldots - 3$$

$$= $$

$$u_3 \quad = $$

$$= $$

$$u_4 \quad = $$

$$= $$

$$u_{20} \quad = $$

$$= $$

$$u_{100} \quad = $$

$$= $$

OS 10.3   *Finding the Formula*

Determine a formula for this sequence:

$$7 \quad\quad 12 \quad\quad 17 \quad\quad 22 \quad\quad 27 \quad\quad 32 \quad\quad .....$$

The difference is ☐ , so the formula is

$$u_n = \boxed{}\, n \;+\; c$$

Use the first term to obtain c

$$7 = \boxed{} \times 1 + c \;\Rightarrow\; c = \boxed{}$$

So the formula is

$$u_n =$$

Determine a formula for this sequence:

$$40 \quad\quad 37 \quad\quad 34 \quad\quad 31 \quad\quad 28 \quad\quad 25 \quad\quad .....$$
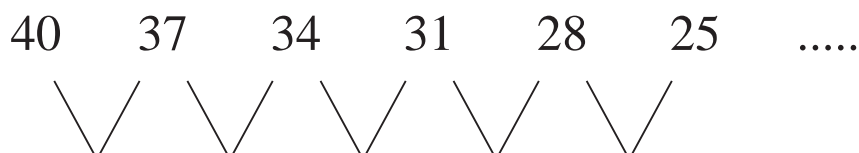
The difference is ☐ , so the formula is

$$u_n = \boxed{}\, n \;+\; c$$

Use the first term to obtain c

$$40 = \boxed{} \times 1 + c \;\Rightarrow\; c = \boxed{}$$

So the formula is

$$u_n =$$

OS 10.4a   *Quadratic Sequences*

Determine the formula for the sequence:

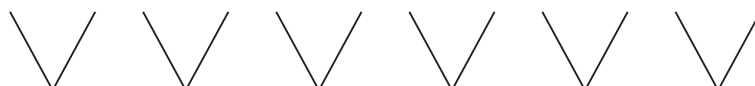| 5 | 11 | 19 | 29 | 41 | 55 | 71 | ..... |

As the second differences are constant and all equal to 2, the sequence will have formula

$$u_n = n^2 +$$

Subtract n^2 from each term to obtain a new sequence

4   7

The formula for this sequence is

$$v_n =$$

Combining the two sequences gives:

$$u_n =$$

OS 10.4b   *Quadratic Sequences*

Determine the formula for the sequence

$$0 \quad 2 \quad 8 \quad 18 \quad 32 \quad 50 \quad 72 \quad .....$$

The sequence will have a formula

$$u_n = \boxed{} n^2 +$$

Now form a new sequence as below:

$$-2 \quad -6$$

This sequence has formula

$$v_n =$$

So the original sequence has formula

$$u_n =$$

OS 10.5

Further Sequences

Use differences to extend the following sequences:

1.   2   3   5   8   13   ....

2.   1   4   5   9   14   ....

3.

$$\frac{3}{7} \quad \frac{4}{10} \quad \frac{5}{13} \quad \frac{6}{16} \quad ..... \quad ..... \quad .....$$

OS 10.6   *Finding the Limit of a Sequence*

What happens to the sequence

$$u_n = \frac{2n - 3}{n + 1}$$

as *n* becomes large?

Complete the following table, and comment on the results.

n	u_n
1	
2	
5	
10	
50	
100	
1000	
2000	
5000	
10 000	