

This assignment covers Units 1, 2, 3 and 4.

## Unit 1

### Question 1

Select the TWO options which correctly describe the recurrence relation

$$u_{r+1} = 3u_r - 5u_{r-1} + r^2.$$

Options

- CF
- A First-order and linear
  - B First-order and non-linear
  - ☒ C Second-order and linear
  - D Second-order and non-linear
  - E Constant coefficients and homogeneous
  - ☒ F Constant coefficients and non-homogeneous
  - G Non-constant coefficients and homogeneous
  - H Non-constant coefficients and non-homogeneous

[There are TWO correct options.]

second order, linear  
constant coefficient  
non homogeneous.

### Question 2

Select the option which is the general solution of the recurrence relation

$$u_{r+1} = -3u_r - 8.$$

Options

- G
- A  $u_n = A(3)^n + 2$
  - B  $u_n = A(3)^n + 4$
  - ☒ C  $u_n = A(3)^n - 2$
  - D  $u_n = A(3)^n - 4$
  - E  $u_n = A(-3)^n + 2$
  - ☒ F  $u_n = A(-3)^n + 4$
  - G  $u_n = A(-3)^n - 2$
  - H  $u_n = A(-3)^n - 4$

$$u_n = B a^n + \frac{P}{a-1}$$

$$A x^n + 3A x^{n-1} + 8 = B(-3)^n - \frac{8}{-3-1}$$

$$3^n + 8 = B(-3)^n - \frac{8}{-3-1}$$

$$B(-3)^n - \frac{8}{-3-1} = 3^n + 8$$

### Question 3

Choose the option which is the general solution of the recurrence relation

$$u_{r+1} = u_r - 3.$$

Options

- B
- A  $u_n = A + 3n$
  - ☒ B  $u_n = A - 3n$
  - C  $u_n = 3A + n$
  - D  $u_n = 3A - n$
  - E  $u_n = An + 3$
  - F  $u_n = An - 3$

$$u_1 = u_0 - 3$$

$$u_2 = u_1 - 3 = u_0 - 6$$

$$u_3 = u_2 - 3 = u_0 - 9$$