

AQA, Edexcel, OCR

A Level

A Level Mathematics

Newton-Raphson method and other
recurrence relations

Name:

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Total Marks:

C2- Newton-Raphson method and other recurrence relations- Questions

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- 1) Write the first four terms of the recurrence relationship defined as

$$U_{n+1} = 3U_n + 1 \quad [2]$$

where $U_0 = 3$

- 2) A relationship is given as

$$R_{n+1} = (AR_n + B) \quad [2]$$

we know that

$$R_0 = 4, R_1 = 6, R_2 = 8, R_3 = 10$$

Determine a general solution and the value for R_4 .

- 3) i) Use the Newton-Raphson method to find the first four terms of the following: [3]

$$x^3 + 3x^2 - 8x + 0.8 = 0$$

You may use $x_0 = 0$

- ii) Explain why $x_0 = \sqrt{\frac{11}{3}} - 1$ is not a viable option. [2]

- 4) What is the value of the term U_{56} for the relationship [2]

$$U_{n+1} = -Un^n$$

where $U_0 = 1$

- 5) i) Draw a flow chart showing how to estimate a solution to $x^2 + 3x - 6 = 0$ using a recurrence process. [4]

- ii) Calculate one of the roots to 2dp. [2]

- 6) i) Using an iterative process find one of the non-integer roots of [4]

$$2x^3 + 2x^2 - 10x = 4$$

- ii) Show that one of the roots is 2. [1]

- 7) Use the Newton-Raphson method to find one of the solutions to [2]

$$x^2 + 5x - 11 = 0$$

You may use $x_0 = 1.6$

- 8) Estimate $\sqrt{2}$ using the Newton Raphson method. [4]