

Edexcel (U.K.) Pre 2017

Questions By Topic

C3 Chap04 Numerical Methods

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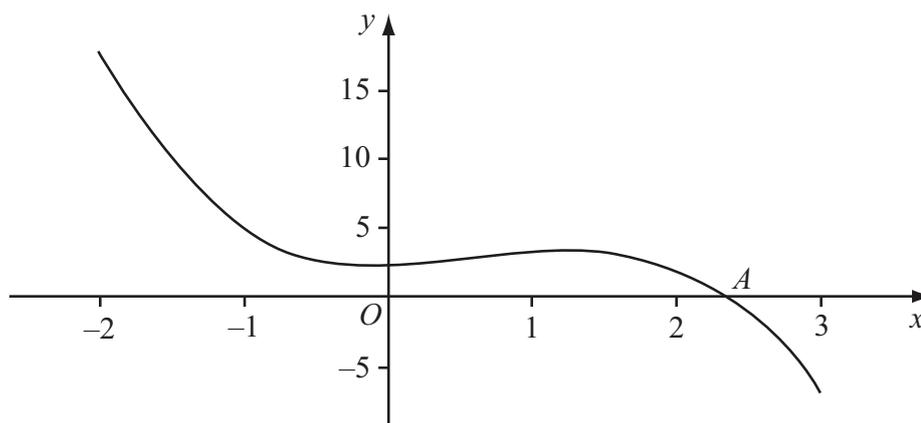


Figure 1

Figure 1 shows part of the curve with equation $y = -x^3 + 2x^2 + 2$, which intersects the x -axis at the point A where $x = \alpha$.

To find an approximation to α , the iterative formula

$$x_{n+1} = \frac{2}{(x_n)^2} + 2$$

is used.

- (a) Taking $x_0 = 2.5$, find the values of x_1 , x_2 , x_3 and x_4 .
Give your answers to 3 decimal places where appropriate.

(3)

- (b) Show that $\alpha = 2.359$ correct to 3 decimal places.

(3)

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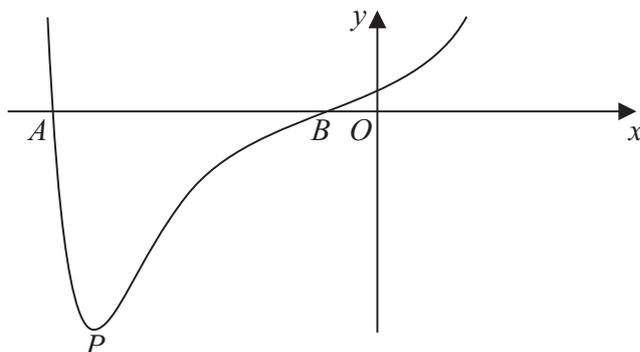


Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = f(x)$ where

$$f(x) = (x^2 + 3x + 1)e^{x^2}$$

The curve cuts the x -axis at points A and B as shown in Figure 2.

(a) Calculate the x coordinate of A and the x coordinate of B , giving your answers to 3 decimal places. (2)

(b) Find $f'(x)$. (3)

The curve has a minimum turning point at the point P as shown in Figure 2.

(c) Show that the x coordinate of P is the solution of

$$x = -\frac{3(2x^2 + 1)}{2(x^2 + 2)} \quad (3)$$

(d) Use the iteration formula

$$x_{n+1} = -\frac{3(2x_n^2 + 1)}{2(x_n^2 + 2)}, \quad \text{with } x_0 = -2.4,$$

to calculate the values of x_1 , x_2 and x_3 , giving your answers to 3 decimal places. (3)

The x coordinate of P is α .

(e) By choosing a suitable interval, prove that $\alpha = -2.43$ to 2 decimal places. (2)