

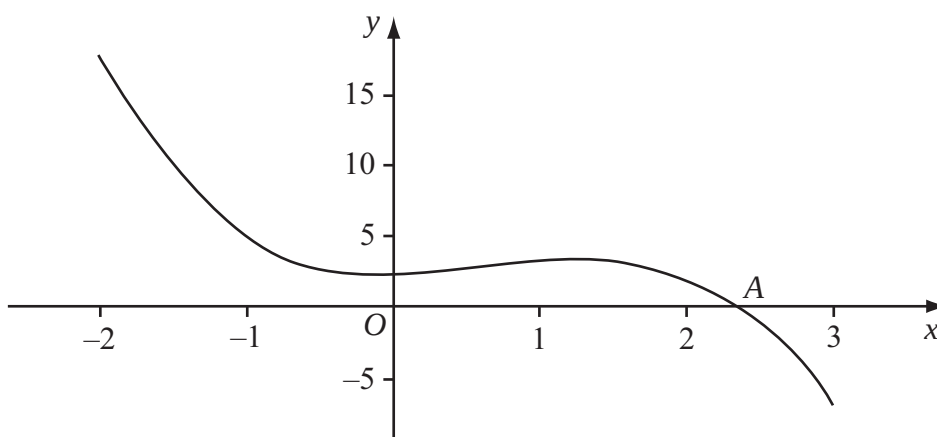


Figure 1 shows part of the curve with equation $y = -x^3 + 2x^2 + 2$, which intersects the x -axis at the point A where $x = \alpha$.

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

(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)

[illegible]

- (2)

(6)

$$2 \tan^2 \theta + 4 \sec \theta + \sec^2 \theta = 2$$



4. (i) Differentiate with respect to x

$$(a) \quad x^2 \cos 3x \quad (3)$$

$$(b) \quad \frac{\ln(x^2+1)}{x^2+1} \tag{4}$$

(ii) A curve C has the equation

$$y = \sqrt[3]{4x+1}, \quad x > -\frac{1}{4}, \quad y > 0$$

The point P on the curve has x -coordinate 2. Find an equation of the tangent to C at P in the form $ax + by + c = 0$, where a , b and c are integers.

(6)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a full page of blank, lined paper. It features approximately 28 horizontal grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings present.

5.

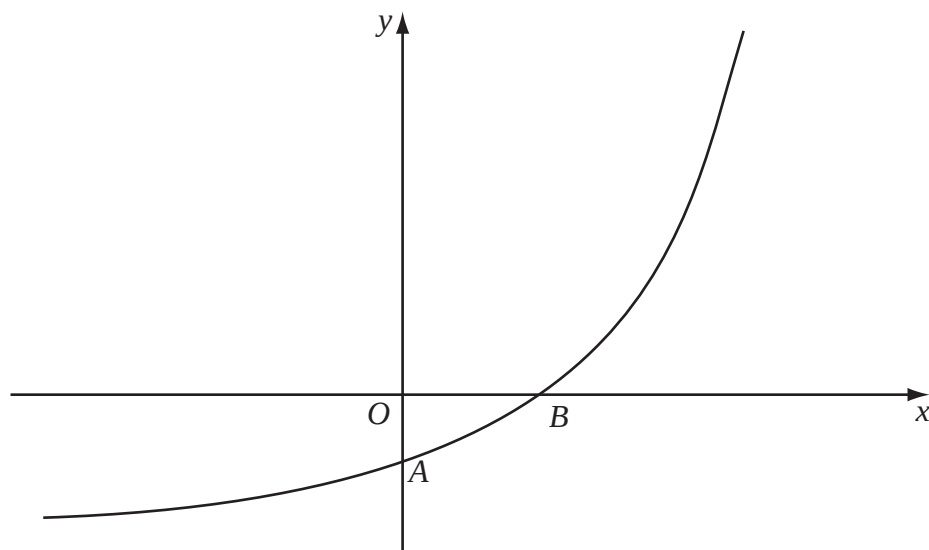


Figure 2

Figure 2 shows a sketch of part of the curve with equation $y = f(x)$, $x \in \mathbb{R}$.

The curve meets the coordinate axes at the points $A(0, 1-k)$ and $B(\frac{1}{2} \ln k, 0)$, where k is a constant and $k > 1$, as shown in Figure 2.

On separate diagrams, sketch the curve with equation

(a) $y = |f(x)|$, (3)

(b) $y = f^{-1}(x)$. (2)

Show on each sketch the coordinates, in terms of k , of each point at which the curve meets or cuts the axes.

Given that $f(x) = e^{2x} - k$,

(c) state the range of f , (1)

(d) find $f^{-1}(x)$, (3)

(e) write down the domain of f^{-1} . (1)



Question 5 continued





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[illegible]

- (1)

- $$\operatorname{cosec} x - 8 \cos x = 0$$

(5)