

- 14 (a)** The equation $x^3 = e^{6-2x}$
has a single solution, $x = \alpha$
By considering a suitable change of sign, show that α lies between 0 and 4 [2 marks]

- 14 (b)** Show that the equation $x^3 = e^{6-2x}$ can be rearranged to give

$$x = 3 - \frac{3}{2} \ln x$$

[3 marks]

- 14 (c) (i)** Use the iterative formula

$$x_{n+1} = 3 - \frac{3}{2} \ln x_n$$

with $x_1 = 4$, to find x_2 , x_3 and x_4

Give your answers to three decimal places. [2 marks]

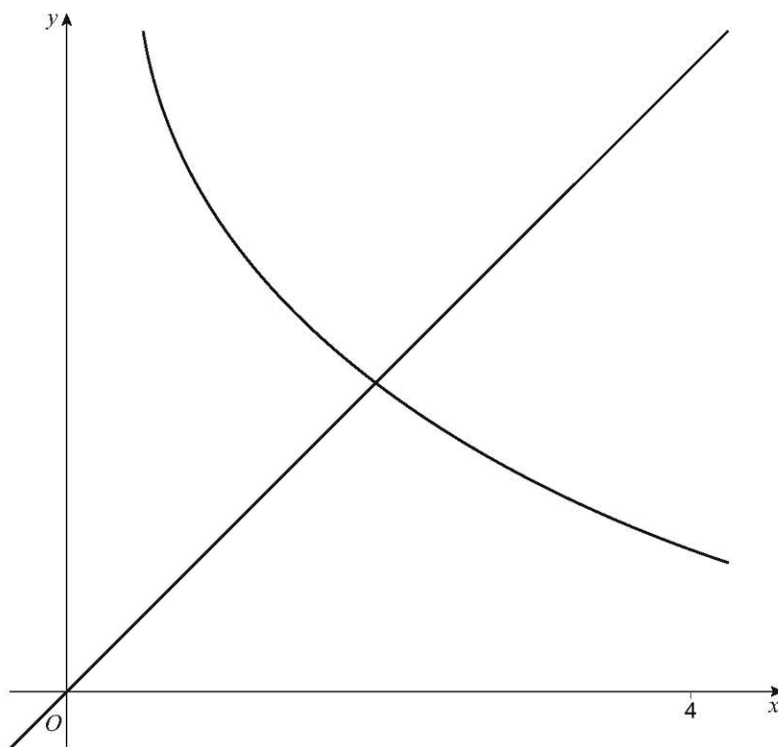
- 14 (c) (ii)** Figure 1 below shows a sketch of parts of the graphs of

$$y = 3 - \frac{3}{2} \ln x \text{ and } y = x$$

On Figure 1, draw a staircase or cobweb diagram to show how convergence takes place

Label, on the x -axis, the positions of x_2 , x_3 and x_4 [2 marks]

Figure 1



- 14 (c) (iii)** Explain why the iterative formula

$$x_{n+1} = 3 - \frac{3}{2} \ln x_n$$

fails to converge to α when the starting value is $x_1 = 0$

[1 mark]