6.

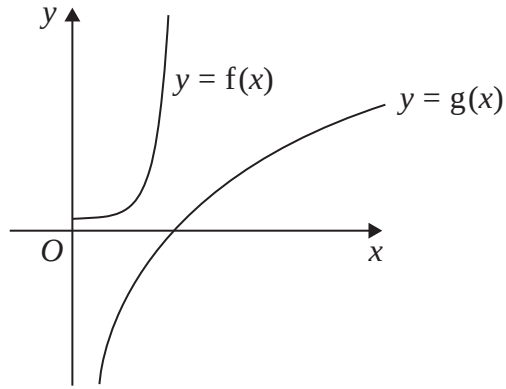

Figure 1

Figure 1 shows a sketch of the curves with equations $y = \mathrm{f}(x)$ and $y = \mathrm{g}(x)$ where

$$\mathrm{f}(x) = \mathrm{e}^{4x^2 - 1} \qquad x > 0$$

$$\mathrm{g}(x) = 8 \ln x \qquad x > 0$$

(a) Find

(i) $\mathrm{f}'(x)$

(ii) $\mathrm{g}'(x)$

(2)

Given that $\mathrm{f}'(x) = \mathrm{g}'(x)$ at $x = \alpha$

(b) show that α satisfies the equation

$$4x^2 + 2 \ln x - 1 = 0$$

(2)

The iterative formula

$$x_{n+1} = \sqrt{\frac{1 - 2 \ln x_n}{4}}$$

is used with $x_1 = 0.6$ to find an approximate value for α

(c) Calculate, giving each answer to 4 decimal places,

(i) the value of x_2

(ii) the value of α

(3)