

10 A curve C has equation

$$y = x^k \ln x \text{ for } x > 0$$

where k is a positive integer.

10 (a) Show that

$$\frac{dy}{dx} = x^{k-1} [A + k \ln x]$$

where A is a constant to be found.

[4 marks]

10 (b) Hence show that the y -coordinate of the stationary point of C can be written as $-\frac{1}{ke}$

Fully justify your answer.

[5 marks]

10 (c) Given that the stationary point of C has coordinates $\left(\frac{1}{e}, -\frac{1}{e}\right)$ state the value of k

[1 mark]

10 (d) Prove that C does **not** have a point of inflection.

[3 marks]