Differentiation – 2021 A2

1. June/2021/Paper_9709/21/No.4

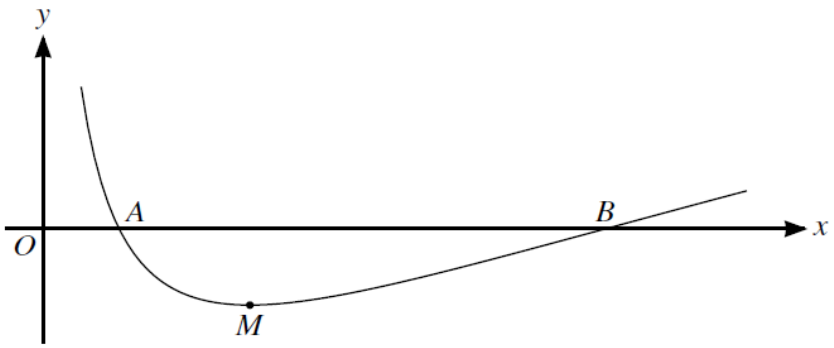
A curve has parametric equations

$$x = \ln(2t + 6) - \ln t, \qquad y = t \ln t.$$

(a) Find the value of t at the point P on the curve for which $x = \ln 4$. [3]

(b) Find the exact gradient of the curve at P. [5]

2. June/2021/Paper_9709/22/No.6



The diagram shows the curve with equation

$$y = (\ln x)^2 - 2\ln x.$$

The curve crosses the x-axis at the points A and B, and has a minimum point M.

(a) Find the exact value of the gradient of the curve at each of the points A and B. [6]

(b) Find the exact x-coordinate of M. [2]

3. March/2021/Paper_9709/22/No.3

The parametric equations of a curve are

$$x = e^{2t} \cos 4t, \qquad y = 3 \sin 2t.$$

Find the gradient of the curve at the point for which $t = 0$. [5]