Logarithmic and exponential functions

Applications of derivatives (1)

QUESTION **1**   Find the equation of the tangent to the curve $y = 2 \ln x$ at the point where $x = e$

QUESTION **2**   Find the equation of the normal to the curve $y = 2e^{-x}$ at the point where $x = 1$

QUESTION **3**   The tangent to the curve $y = e^x$ at the point P meets the x-axis at an angle of 45°. Find the coordinates of P.

QUESTION **4**   Find the maximum value of $\dfrac{\ln x}{x}$

Logarithmic and exponential functions

Applications of derivatives (2)

QUESTION **1**   Consider $f(x) = e^x(1 - x)$
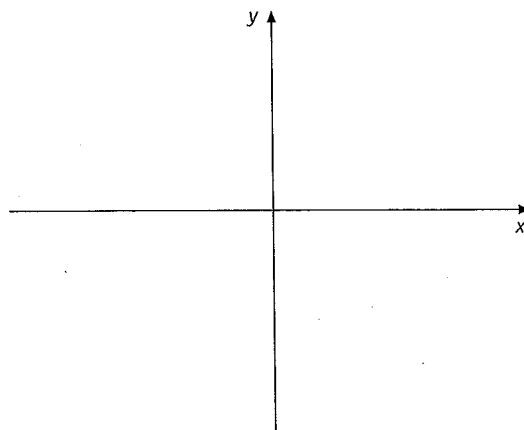
a Where does the curve $y = f(x)$ cross the x-axis?

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b Find any stationary points and determine their nature.

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c Find any points of inflexion.

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d Complete:

i as $x \to \infty$, $y \to$ _____   **ii** as $x \to -\infty$, $y \to$ _____

e Sketch the curve $y = f(x)$

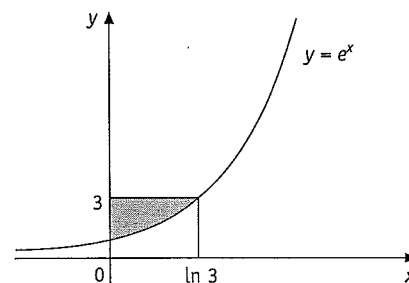# Logarithmic and exponential functions

Applications of integrals of e^x
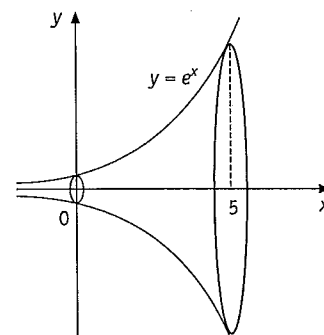
QUESTION **1**

a   Find the area bounded by the curve $y = e^x$, the x-axis, $x = 0$ and $x = \ln 3$

b   Hence find the shaded area.

QUESTION **2**   A curve $y = f(x)$ has a turning point at $(0, 4)$. If $f''(x) = e^x + e^{-x}$ find the equation of the curve.
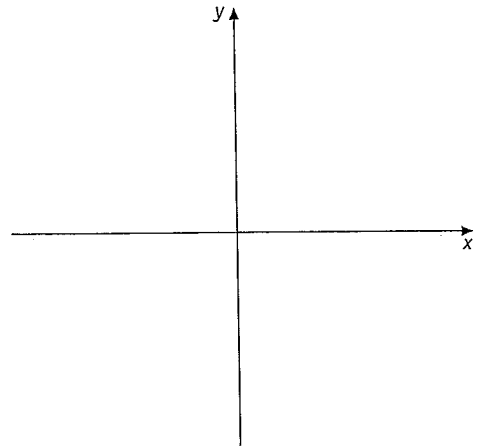
QUESTION **3**   Show that the volume of the solid of revolution formed by rotating the curve $y = e^x$, between $x = 0$ and $x = 5$ about the x-axis is given by $\dfrac{\pi}{2}(e^{10} - 1)$ units^3.

Logarithmic and exponential functions

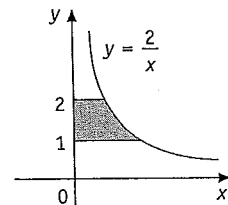## Applications of integration of $\dfrac{1}{x}$

QUESTION **1** Find the exact area bounded by the curve $y = \dfrac{4}{x}$, the x-axis and the ordinates $x = 2$ and $x = 4$

QUESTION **2** The gradient function of a curve is given by $6x - \dfrac{2}{2x - 1}$. Find the equation of the curve if it passes through the point (1, 7).

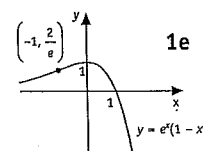QUESTION **3** Find the area shaded in the diagram.

$y = \dfrac{2}{x}$