1 **a** Using the same scales and the same axes, sketch the graphs of $y = |2x|$ and $y = |x - a|$, where $a > 0$.

b Write down the coordinates of the points where the graph of $y = |x - a|$ meets the axes.

c Show that the point with coordinates $(-a, 2a)$ lies on both graphs.

d Find the coordinates, in terms of a, of a second point which lies on both graphs. **E**

2 **a** Sketch, on a single diagram, the graphs of $y = a^2 - x^2$ and $y = |x + a|$, where a is a constant and $a > 1$.

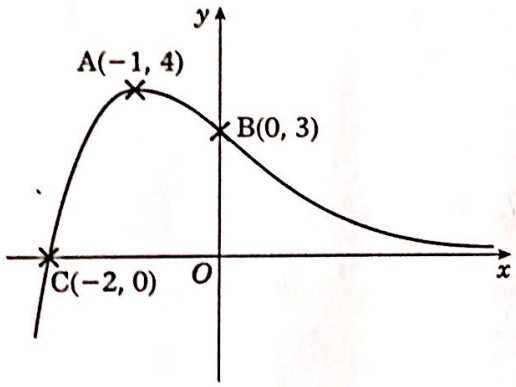
b Write down the coordinates of the points where the graph of $y = a^2 - x^2$ cuts the coordinate axes.

c Given that the two graphs intersect at $x = 4$, calculate the value of a. **E**

3 Differentiate with respect to x:

a $\ln x^2$ **b** $x^2 \sin 3x$

4 The diagram shows a sketch of the graph of $y = f(x)$. The curve has a maximum at the point A$(-1, 4)$ and crosses the axes at the points B$(0, 3)$ and C$(-2, 0)$.



Sketch the graph of:

a $y = 3f(x - 2)$ **b** $y = \frac{1}{2}f(\frac{1}{2}x)$ **c** $y = -f(x) + 4$ **d** $y = -2f(x + 1)$

For each graph, find, where possible, the coordinates of the maximum or minimum and the coordinates of the intersection points with the axes.

5 Given that

$$f(x) \equiv 3 - \frac{x^2}{4} + \ln\frac{x}{2}, \quad x > 0$$

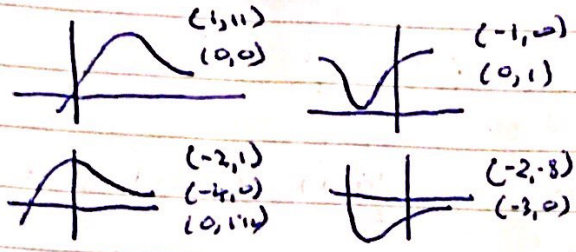
find $f'(x)$.

6 Given that $x = y^2 \ln y$, $y > 0$,

a find $\frac{dx}{dy}$

b use your answer to part **a** to find in terms of e, the value of $\frac{dy}{dx}$ at $y = e$.

CRACK THE CODE
2-5-3-1-4-6-3

L


L $y = 2x + 4$

E **a** $\frac{2}{x}$ **b** $3x^2 \cos 3x + 2x \sin 3x$

G a) $y + 2y \ln y$ b) $\frac{3}{e}$

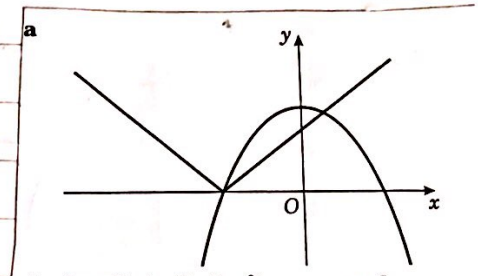
R $f'(x) = -\frac{x}{2} + \frac{1}{x}$

K $f'(x) = \frac{x}{2} - \frac{1}{x}$

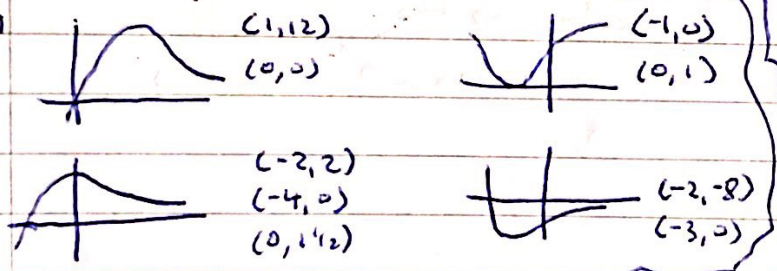
P **a** $y + 2y \ln y$ **b** $\frac{1}{3e}$

C $x = \frac{1}{3}$

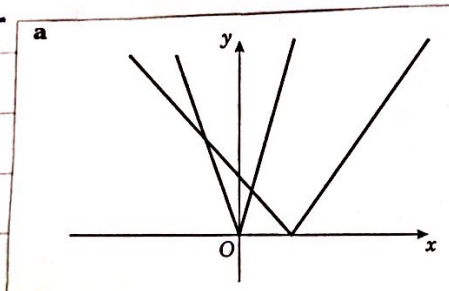
T $y = 2x + 1$

P


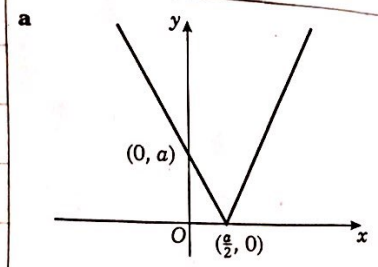
b $(-a, 0), (a, 0), (0, a^2)$ **c** $a = 5$

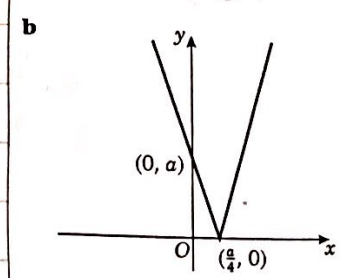
A


Y a) $\frac{2}{x}$ b) $3x^2 \cos 3x + 2x \sin x$

T


b $(a, 0), (0, a)$ **d** $\left(\frac{a}{3}, \frac{2a}{3}\right)$

N




c $a = 6, a = 10$