**3.**

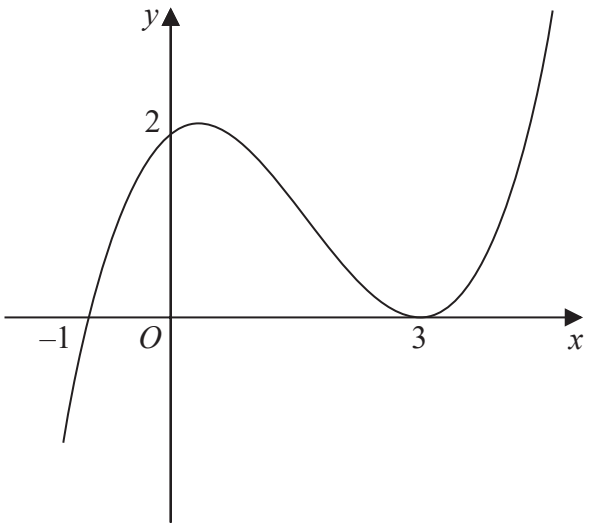



**Figure 1**

Figure 1 shows a sketch of the curve with equation $y = f(x)$.

The curve passes through the points $(-1, 0)$ and $(0, 2)$ and touches the $x$-axis at the point $(3, 0)$.

On separate diagrams, sketch the curve with equation

(a) $y = f(x + 3)$

**(3)**

(b) $y = f(-3x)$

**(3)**

On each diagram, show clearly the coordinates of all the points where the curve cuts or touches the coordinate axes.

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**Question 3 continued**

**(Total for Question 3 is 6 marks)**

**4.** The curve $C_1$ has equation

$$y = x^2 + kx - 9$$

and the curve $C_2$ has equation

$$y = -3x^2 - 5x + k$$

where $k$ is a constant.

Given that $C_1$ and $C_2$ meet at a single point $P$

(a) show that

$$k^2 + 26k + 169 = 0$$

**(3)**

(b) Hence find the coordinates of $P$

**(3)**

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