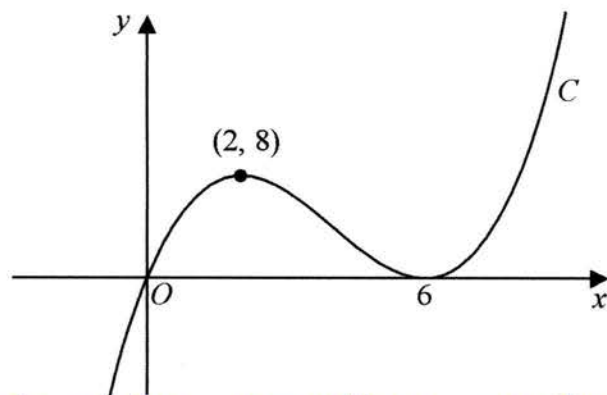


6.



(a) gradient, $f'(x)$: \leftarrow positive \rightarrow negative \rightarrow positive \rightarrow so $2 < x < 6$ (1 mark)

Figure 1

Figure 1 shows a sketch of a curve C with equation $y = f(x)$ where $f(x)$ is a cubic expression in x .

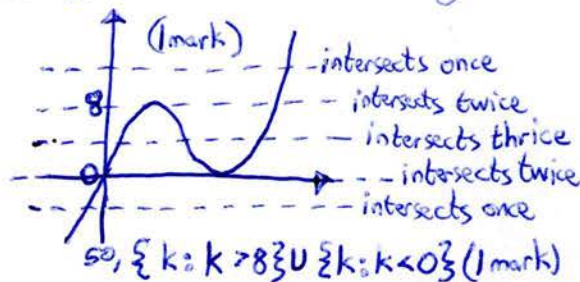
The curve

- passes through the origin
- has a maximum turning point at $(2, 8)$
- has a minimum turning point at $(6, 0)$

(a) Write down the set of values of x for which

$$f'(x) < 0$$

(b) $y = k$ is a horizontal straight line



(1)

The line with equation $y = k$, where k is a constant, intersects C at only one point.

(b) Find the set of values of k , giving your answer in set notation.

(2)

(c) Find the equation of C . You may leave your answer in factorised form.

(3)

(c) by Factor Theorem, $f(0) = 0$ so $(x-0) = x$ is a factor
 $f(6) = 0$ at minimum
 so $(x-6)$ is a repeated factor
 so $y = ax(x-6)^2$
 where a is a constant (1 mark)

at $(2, 8)$, $8 = a(2)(2-6)^2 = a(2)(16) = 32a$ (1 mark)

so $a = \frac{8}{32} = \frac{1}{4}$ and $y = \frac{1}{4}x(x-6)^2$ (1 mark)