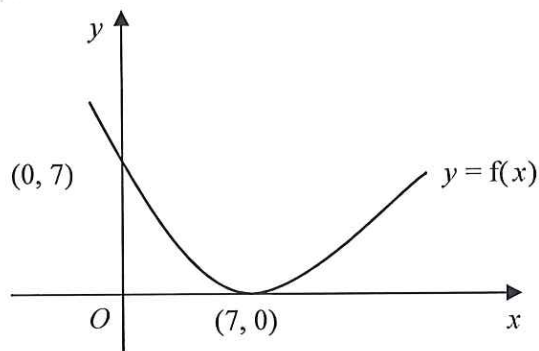


Year 1 Pure ~~Chp 4~~ Exam Questions Sketching Graphs (Answers)

1.



The diagram above shows a sketch of the curve with equation $y = f(x)$. The curve passes through the point $(0, 7)$ and has a minimum point at $(7, 0)$.

On separate diagrams, sketch the curve with equation

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

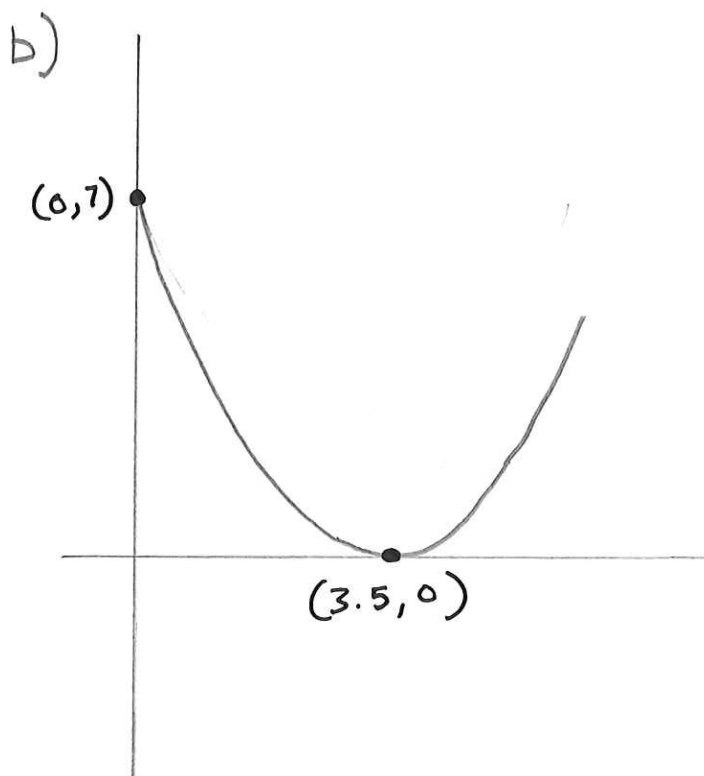
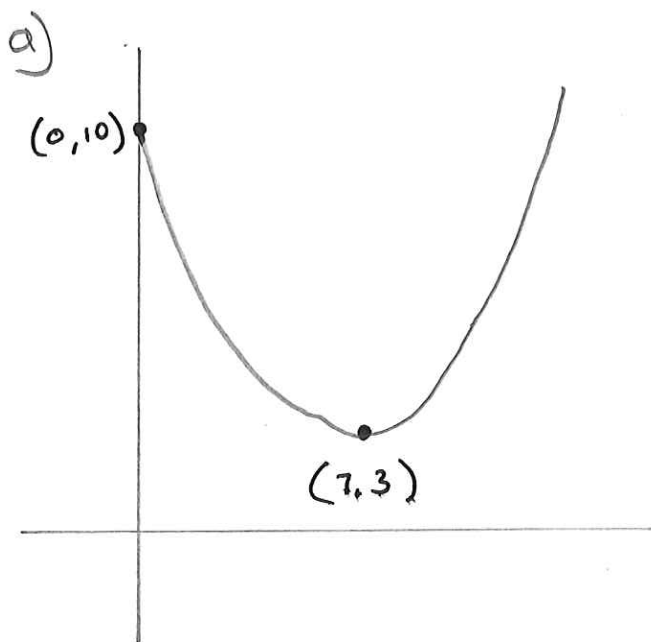
(3)

(b) $y = f(2x)$, $(\frac{1}{2}x, y)$

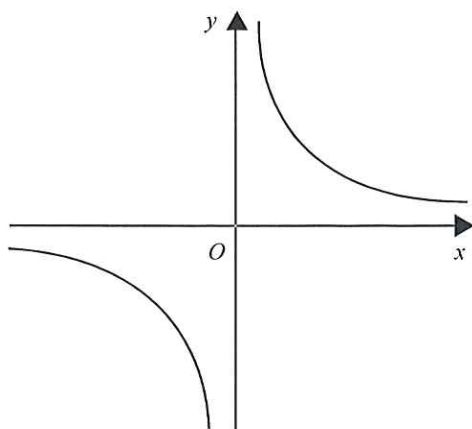
(2)

On each diagram, show clearly the coordinates of the minimum point and the coordinates of the point at which the curve crosses the y -axis.

(Total 5 marks)



2.



$$y = \frac{3}{(x+2)}$$

left 2

The diagram above shows a sketch of the curve with equation $y = \frac{3}{x}$, $x \neq 0$.

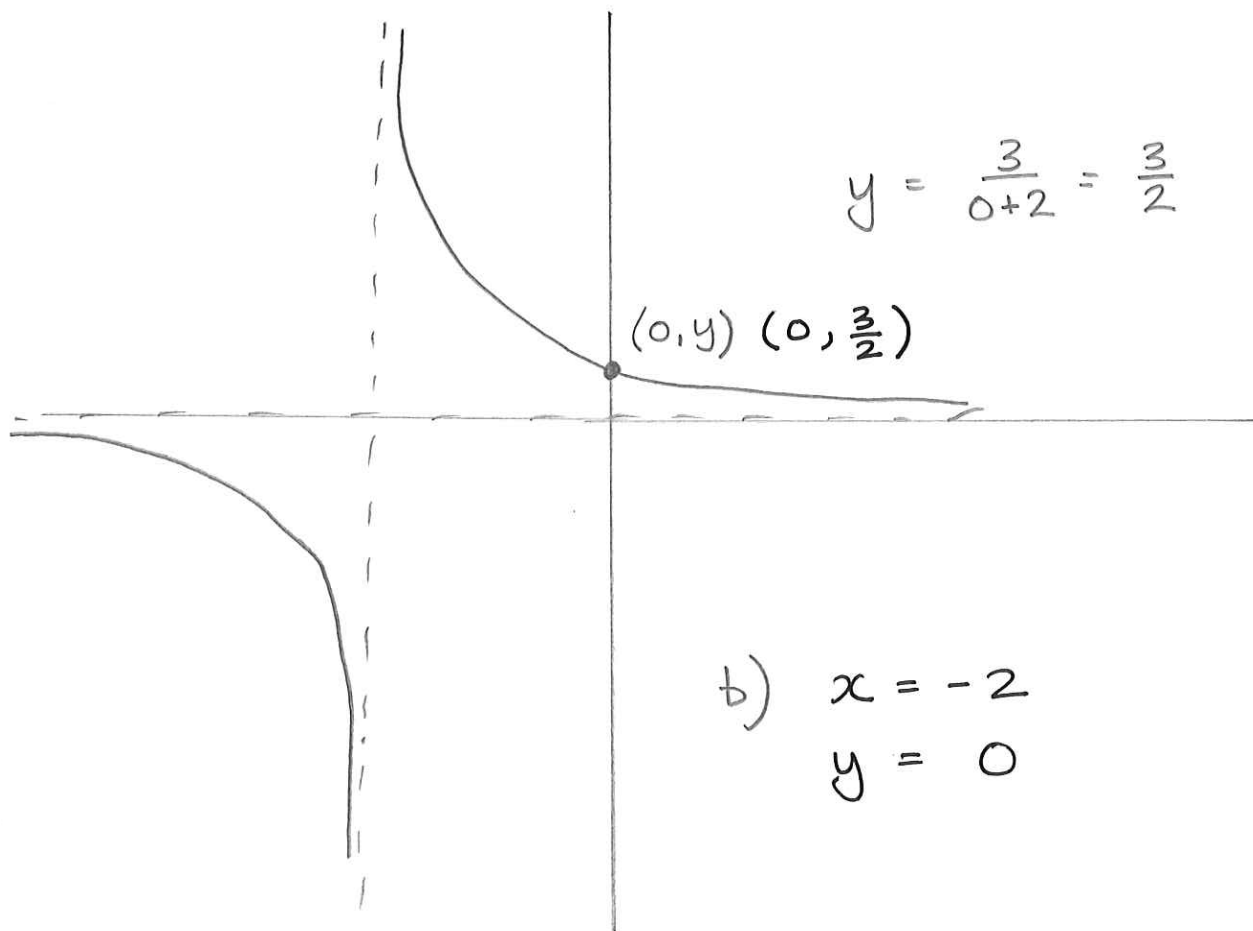
- (a) On a separate diagram, sketch the curve with equation $y = \frac{3}{x+2}$, $x \neq -2$, showing the coordinates of any point at which the curve crosses a coordinate axis.

(3)

- (b) Write down the equations of the asymptotes of the curve in part (a).

(2)

(Total 5 marks)



3. On separate diagrams, sketch the graphs of

(a) $y = (x + 3)^2$,

← left 3

(3)

(b) $y = (x + 3)^2 + k$, where k is a positive constant.

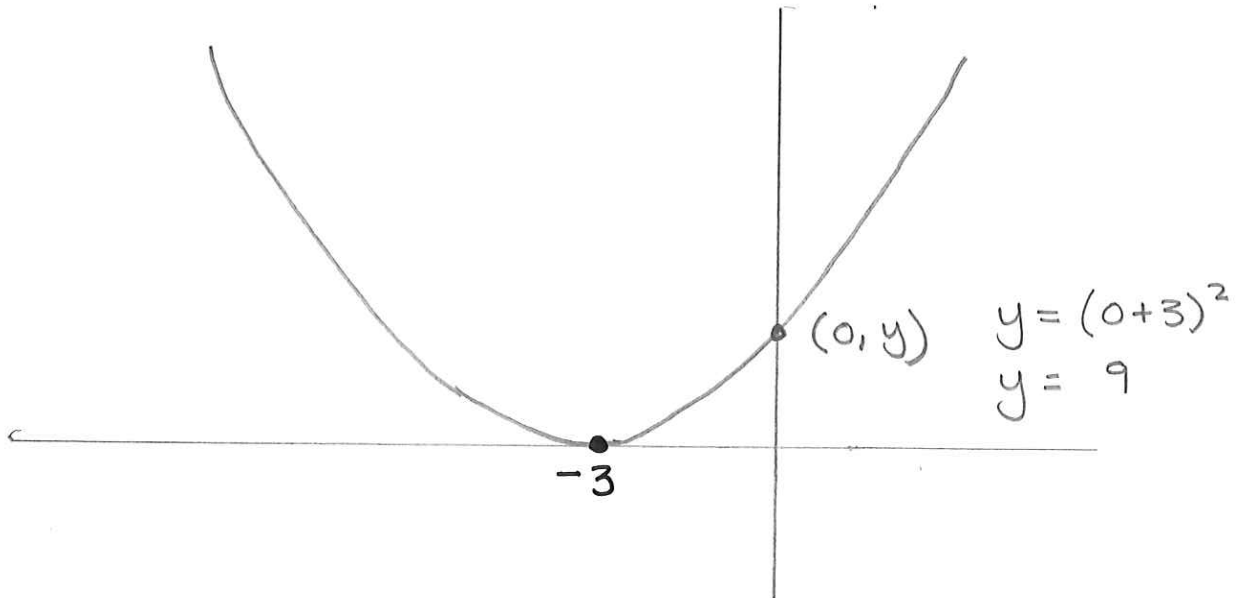
left 3 ↗ ↖ up k

(2)

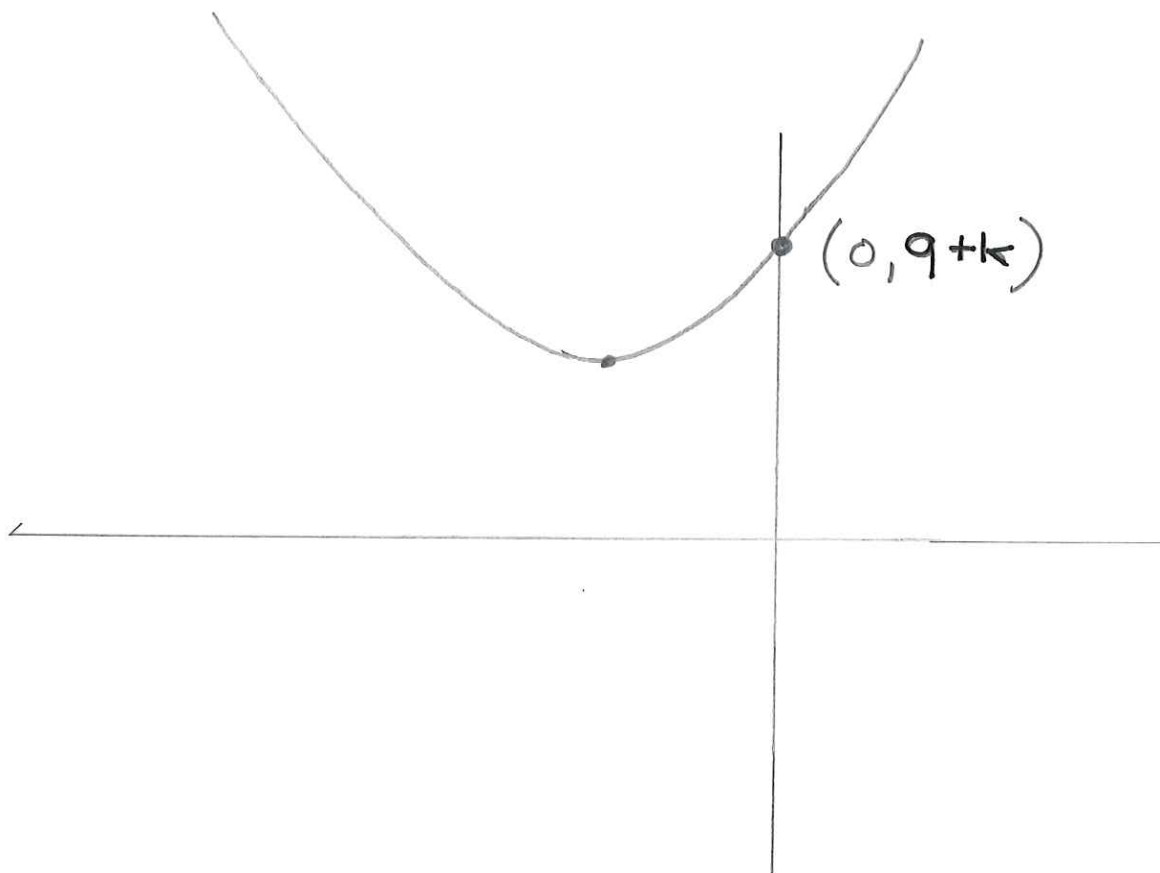
Show on each sketch the coordinates of each point at which the graph meets the axes.

(Total 5 marks)

a)



b)



4. Given that

$$f(x) = \frac{1}{x}, \quad x \neq 0,$$

- (a) sketch the graph of $y = f(x) + 3$ and state the equations of the asymptotes.

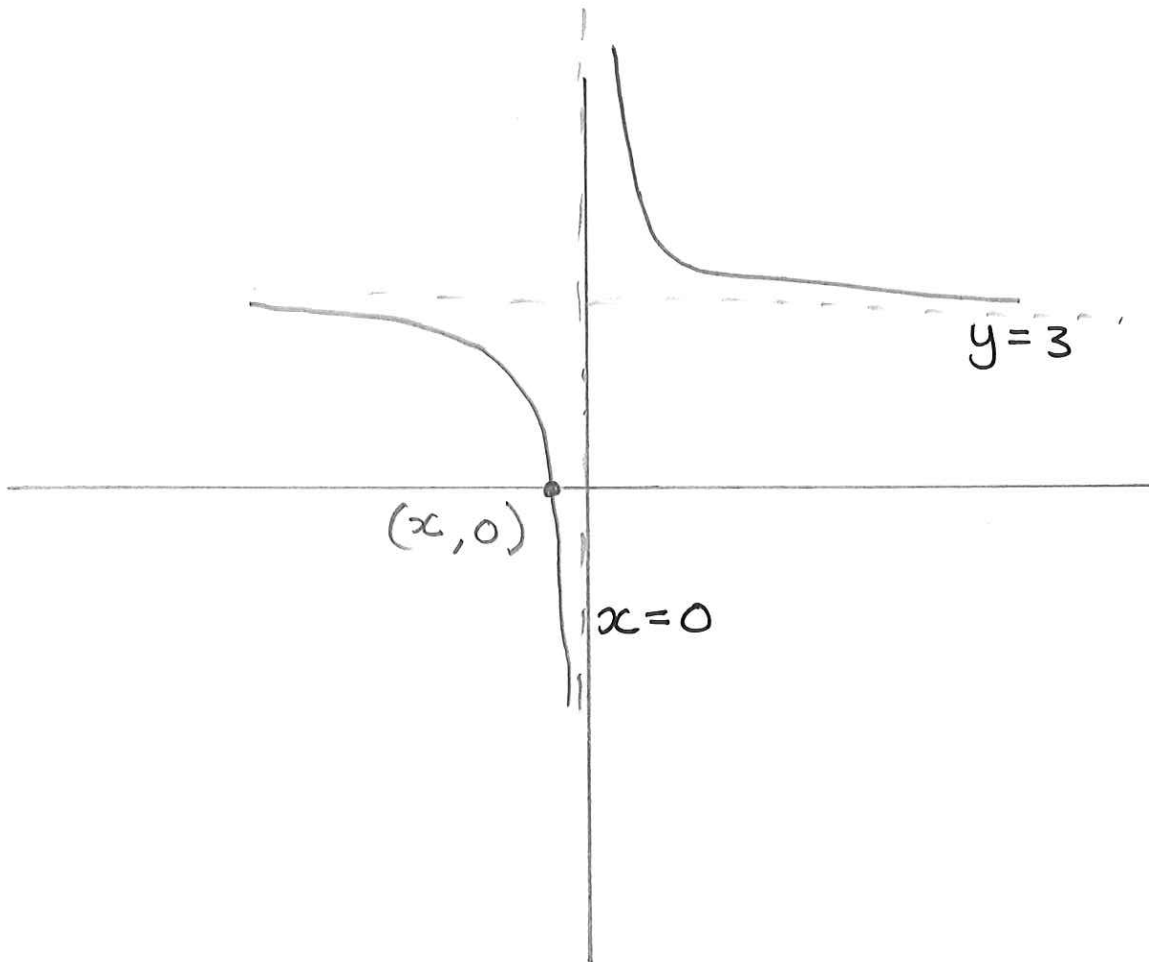
↖ up 3

(4)

- (b) Find the coordinates of the point where $y = f(x) + 3$ crosses a coordinate axis.

(2)

(Total 6 marks)



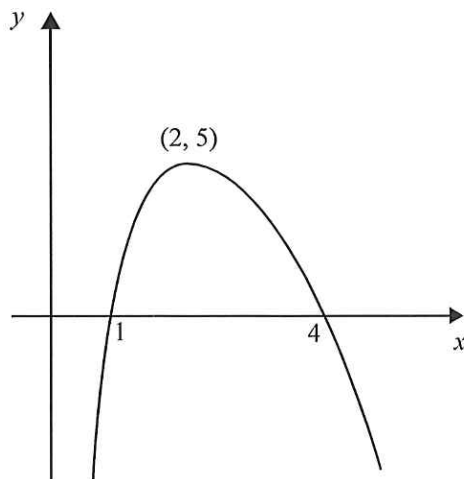
$$b) \quad y = \frac{1}{x} + 3$$

$$0 = \frac{1}{x} + 3$$

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

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

5.



The diagram above shows a sketch of the curve with equation $y = f(x)$. The curve crosses the x -axis at the points $(1, 0)$ and $(4, 0)$. The maximum point on the curve is $(2, 5)$. In separate diagrams sketch the curves with the following equations. On each diagram show clearly the coordinates of the maximum point and of each point at which the curve crosses the x -axis.

(a) $y = 2f(x)$, $(x, 2y)$ (3)

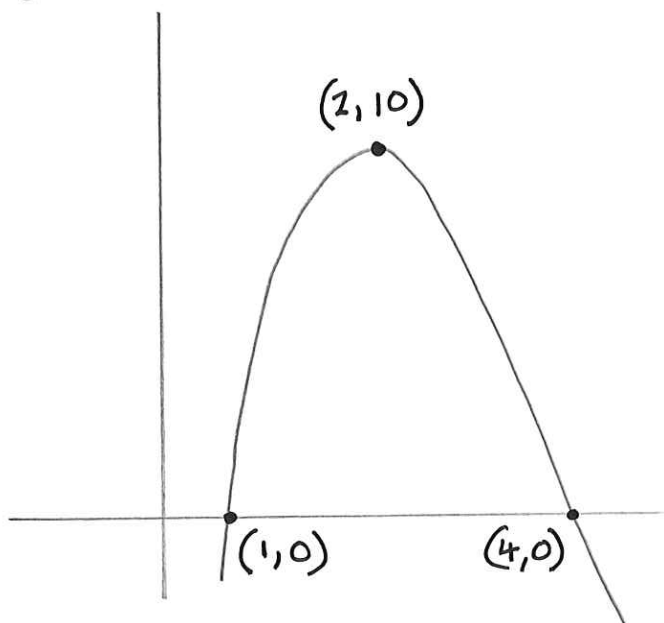
(b) $y = f(-x)$. y axis (3)

The maximum point on the curve with equation $y = f(x + a)$ is on the y -axis.

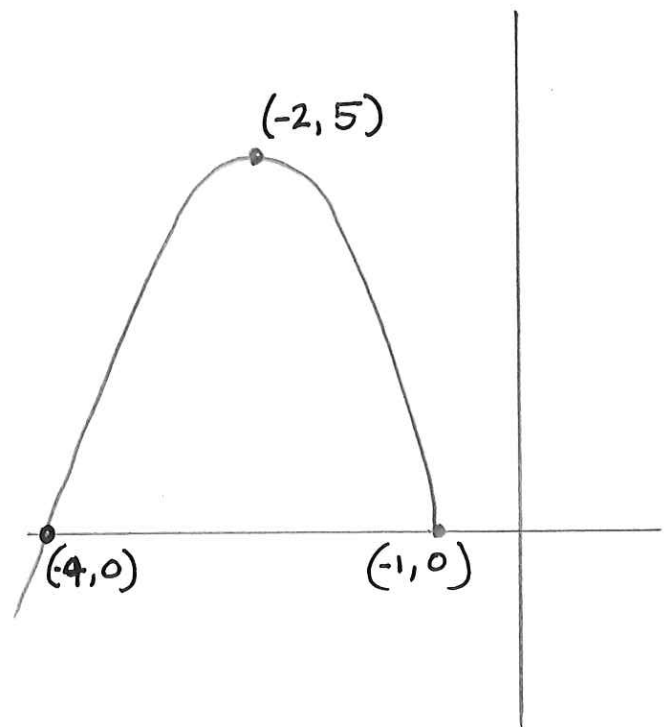
(c) Write down the value of the constant a .

(1)
(Total 7 marks)

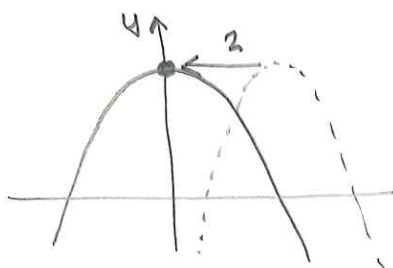
a)



b)

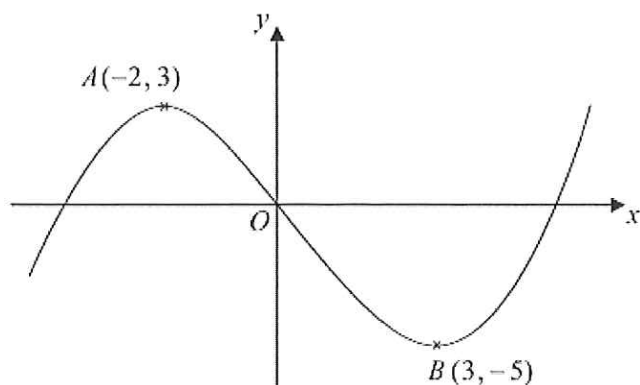


c)



$a = 2$

6.



The diagram above shows a sketch of the curve with equation $y = f(x)$. The curve has a maximum point A at $(-2, 3)$ and a minimum point B at $(3, -5)$.

On separate diagrams sketch the curve with equation

(a) $y = f(x + 3)$ ← left 3

(3)

(b) $y = 2f(x)$ $(a, 2y)$

(3)

On each diagram show clearly the coordinates of the maximum and minimum points.

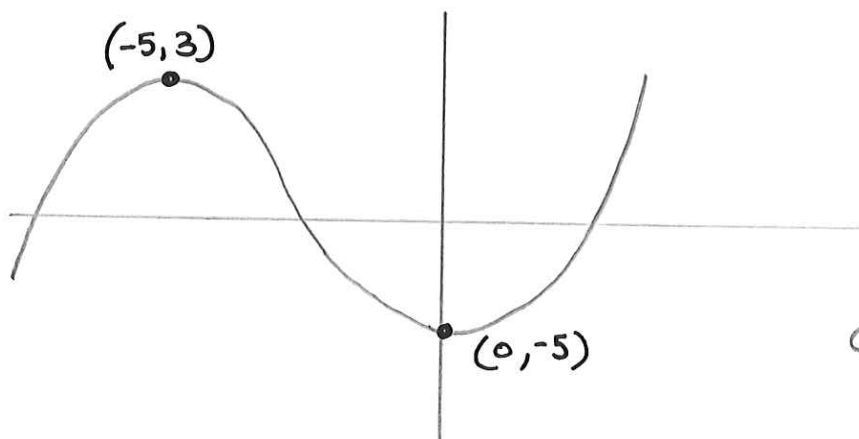
The graph of $y = f(x) + a$ has a minimum at $(3, 0)$, where a is a constant.

(c) Write down the value of a .

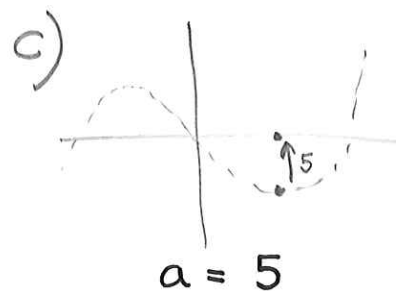
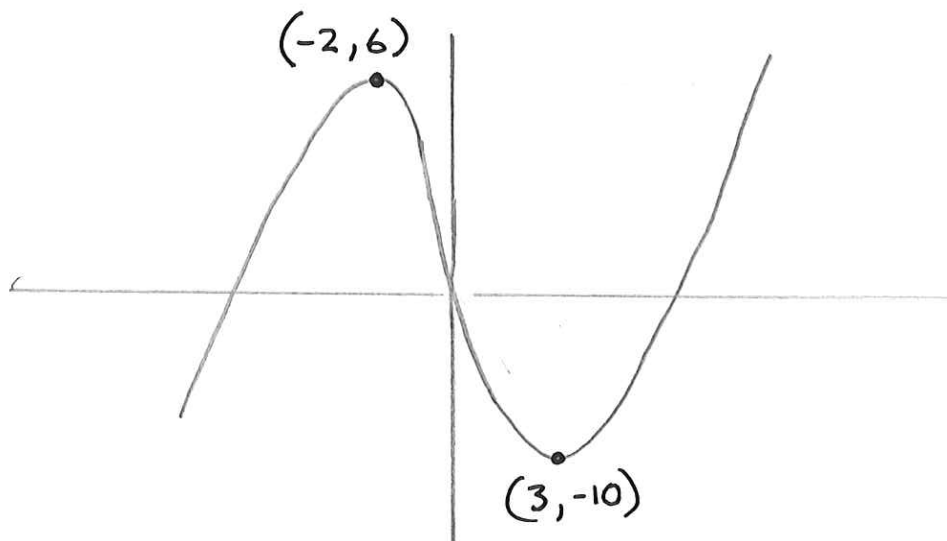
(1)

(Total 7 marks)

a)



b)



7. (a) Factorise completely $x^3 - 4x$.

(3)

(b) Sketch the curve with equation $y = x^3 - 4x$, showing the coordinates of the points where the curve crosses the x -axis.

(3)

(c) On a separate diagram, sketch the curve with equation

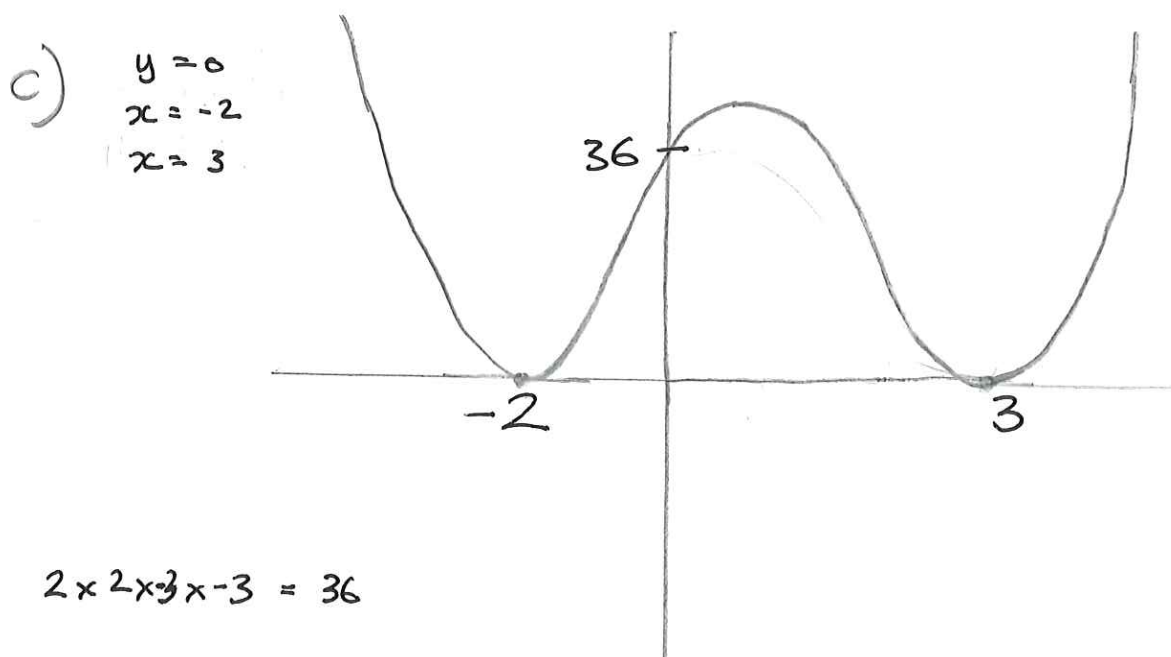
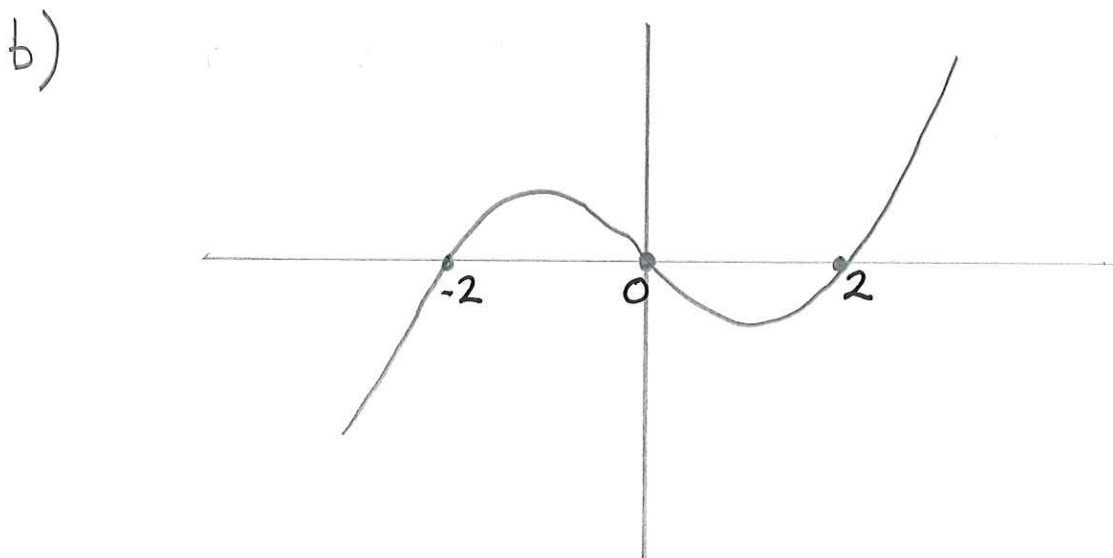
$$y = (x - 1)^3 - 4(x - 1),$$

showing the coordinates of the points where the curve crosses the x -axis.

(3)

(Total 9 marks)

a) $x(x^2 - 4)$
 $x(x - 2)(x + 2)$



8. (a) On the same axes sketch the graphs of the curves with equations

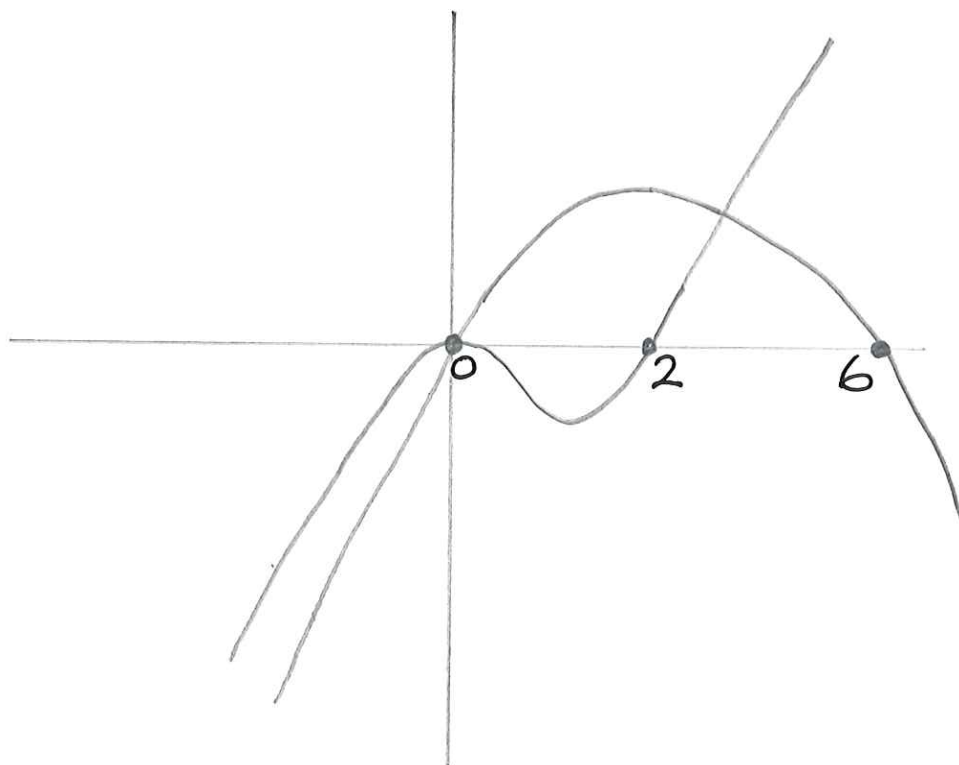
(i) $y = x^2(x-2)$, $y = \underset{0}{x} \underset{0}{x} (\underset{2}{x} - 2)$ (3)

(ii) $y = x(6-x)$, $y = \underset{0}{6} \underset{6}{x} - x^2$ (3)

and indicate on your sketches the coordinates of all the points where the curves cross the x -axis.

(b) Use algebra to find the coordinates of the points where the graphs intersect.

(7)
(Total 13 marks)



b) $x^2(x-2) = x(6-x)$

$x^3 - 2x^2 = 6x - x^2$

$x^3 - x^2 - 6x = 0$

$x(x^2 - x - 6) = 0$

$x(x-3)(x+2) = 0$

$x = 0, 3, -2$

$\therefore$

$y = 0(6-0) = 0$

$y = 3(6-3) = 9$

$y = -2(6-(-2)) = -16$

$(0, 0)$

$(3, 9)$

$(-2, -16)$