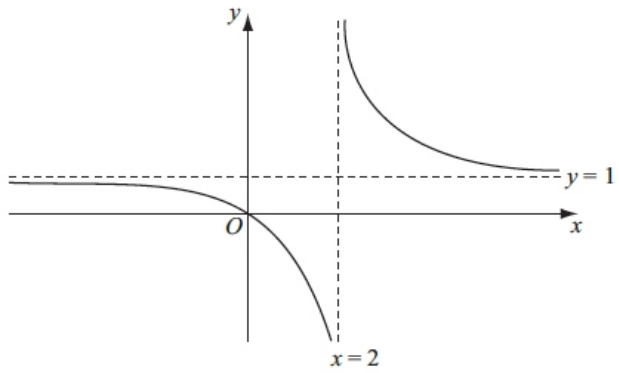
Transformation of Functions Exam Questions Sheet 2

Q1.



Thef figure shows a sketch of the curve with equation $y = f(x)$ where

$$f(x) = \frac{x}{x-2}, \quad x \neq 2$$

The curve passes through the origin and has two asymptotes, with equations $y = 1$ and $x = 2$, as shown in Figure 1.

(a) In the space below, sketch the curve with equation $y = f(x - 1)$ and state the equations of the asymptotes of this curve.

(3)

(b) Find the coordinates of the points where the curve with equation $y = f(x - 1)$ crosses the coordinate axes.

(4)

(Total 7 marks)

Q2.

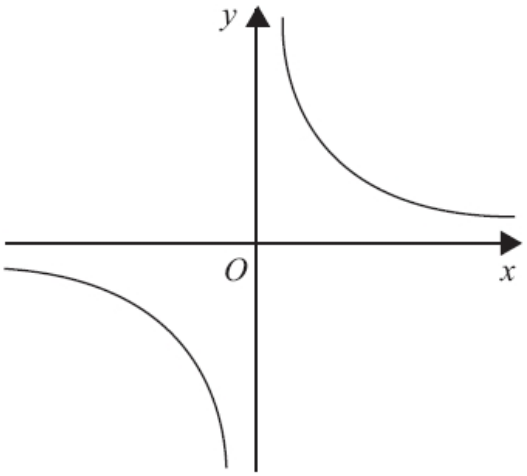


Figure 1

Figure 1 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)

Q3.

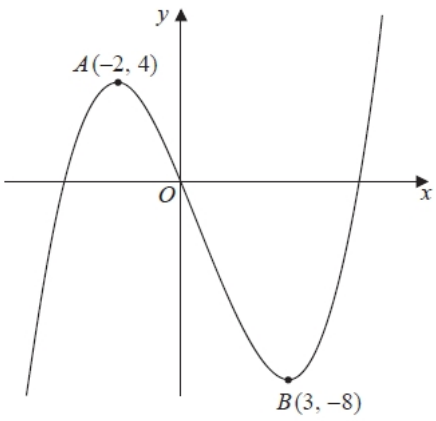


Figure 1

Figure 1 shows a sketch of part of the curve with equation $y = f(x)$. The curve has a maximum point A at $(–2, 4)$ and a minimum point B at $(3, –8)$ and passes through the origin O.

On separate diagrams, sketch the curve with equation

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

(2)

(b) $y = f(x) – 4$

(3)

On each diagram, show clearly the coordinates of the maximum and the minimum points and the coordinates of the point where the curve crosses the y-axis.

(Total for question = 5 marks)

Q4.

Figure 1:

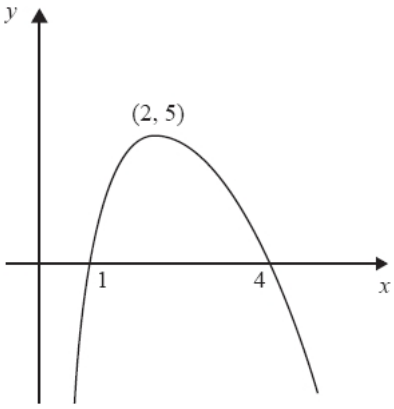


Figure 1 shows a sketch of the curve with equation $y = f(x)$. The curve crosses the x-axis at the points $(1, 0)$ and $(4, 0)$. The maximum point on the curve is $(2, 5)$.
In separate diagrams sketch the curves with the following equations.
On each diagram show clearly the coordinates of the maximum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

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

(3)

(b) $y = f(–x)$.

(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 marks)

Q5.

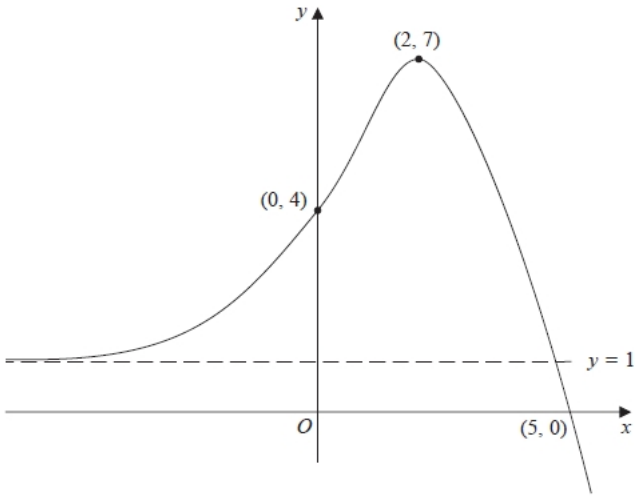


Figure 1

Figure 1 shows the sketch of a curve with equation $y = f(x)$, $x \in \mathbb{R}$.

The curve crosses the y-axis at (0, 4) and crosses the x-axis at (5, 0).

The curve has a single turning point, a maximum, at (2, 7).

The line with equation $y = 1$ is the only asymptote to the curve.

(a) State the coordinates of the turning point on the curve with equation $y = f(x - 2)$.

(1)

(b) State the solution of the equation $f(2x) = 0$

(1)

(c) State the equation of the asymptote to the curve with equation $y = f(-x)$.

(1)

Given that the line with equation $y = k$, where k is a constant, meets the curve $y = f(x)$ at only one point,

(d) state the set of possible values for k.

(2)

(Total for question = 5 marks)

Q6.

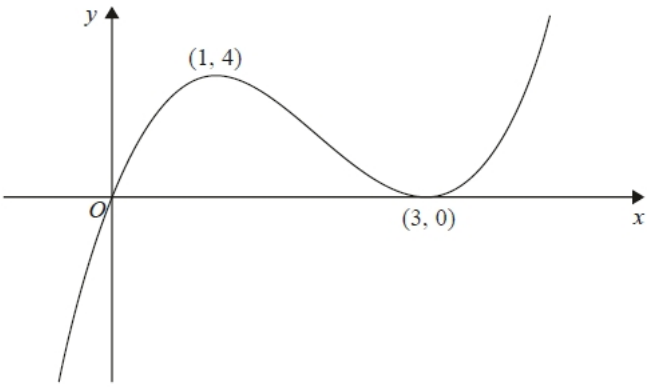


Figure 2

Figure 2 shows a sketch of the curve with equation $y = f(x)$ where

$$f(x) = x(3-x)^2 \qquad x \in \mathbb{R}$$

The curve passes through the origin and touches the x-axis at the point (3, 0).
There is a maximum point at (1, 4) and a minimum point at (3, 0).

(a) On separate diagrams, sketch the curve with equation

(i) $y = f(\frac{1}{2}x)$,
(ii) $y = f(x + 2)$.
On each sketch indicate clearly the coordinates of

- any points where the curve crosses or touches the x-axis,
- the point where the curve crosses the y-axis,
- any maximum or minimum points.

(6)

The curve with equation $y = f(x) + k$, where k is a non-zero constant, has a maximum point at $(a, 0)$.

(b) Write down the values of a and k.

(2)

(Total for question = 8 marks)