

Questions

Q1.

Solve the simultaneous equations

$$\begin{aligned}x + y &= 2 \\4y^2 - x^2 &= 11\end{aligned}$$

(7)

(Total 7 marks)

Q2.

Solve the simultaneous equations

$$\begin{aligned}y - 3x + 2 &= 0 \\y^2 - x - 6x^2 &= 0\end{aligned}$$

(7)

(Total 7 marks)

Q3.

Given the simultaneous equations

$$\begin{aligned}2x + y &= 1 \\x^2 - 4ky + 5k &= 0\end{aligned}$$

where k is a non zero constant,

(a) show that

$$x^2 + 8kx + k = 0$$

(2)

Given that $x^2 + 8kx + k = 0$ has equal roots,

(b) find the value of k .

(3)

(c) For this value of k , find the solution of the simultaneous equations.

(3)

(Total 8 marks)

Q4.

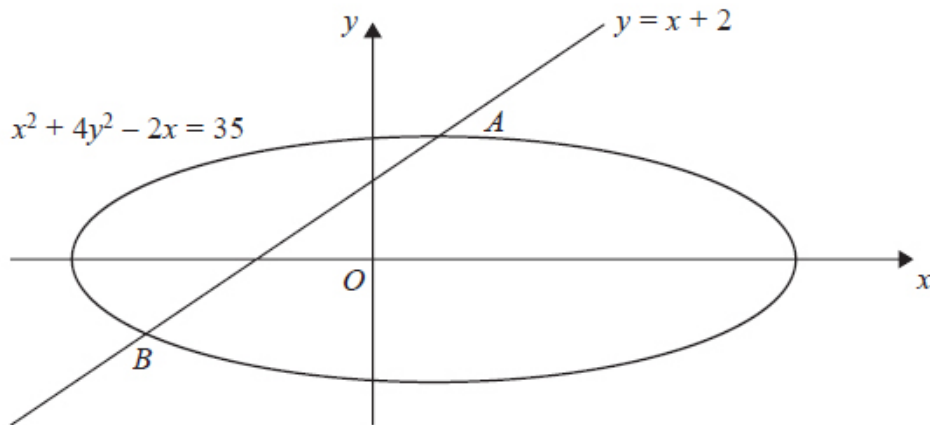


Figure 2

The line $y = x + 2$ meets the curve $x^2 + 4y^2 - 2x = 35$ at the points A and B as shown in Figure 2.

(a) Find the coordinates of A and the coordinates of B .

(6)

(b) Find the distance AB in the form $r\sqrt{2}$ where r is a rational number.

(3)

(Total 9 marks)

Q5.

Solve the simultaneous equations

$$\begin{aligned}y - 2x - 4 &= 0 \\4x^2 + y^2 + 20x &= 0\end{aligned}$$

(7)

(Total for question = 7 marks)

Q6.

(a) By eliminating y from the equations

$$y = x - 4$$

$$2x^2 - xy = 8,$$

show that

$$x^2 + 4x - 8 = 0$$

(2)

(b) Hence, or otherwise, solve the simultaneous equations

$$y = x - 4,$$

$$2x^2 - xy = 8,$$

giving your answers in the form $a \pm b\sqrt{3}$, where a and b are integers.

(5)

(Total 7 marks)

Q7.

Solve the simultaneous equations

$$y + 4x + 1 = 0$$

$$y^2 + 5x^2 + 2x = 0$$

(6)

(Total for question = 6 marks)

Q8.

The straight line L_1 passes through the points $(-1, 3)$ and $(11, 12)$.

(a) Find an equation for L_1 in the form $ax + by + c = 0$,
where a , b and c are integers.

(4)

The line L_2 has equation $3y + 4x - 30 = 0$.

(b) Find the coordinates of the point of intersection of L_1 and L_2 .

(3)

(Total 7 marks)

Q9.

The curve C has equation $y = \frac{3}{x}$ and the line l has equation $y = 2x + 5$.

(a) Sketch the graphs of C and l , indicating clearly the coordinates of any intersections with the axes.

(3)

(b) Find the coordinates of the points of intersection of C and l .

(6)

(Total 9 marks)

Q10.

The straight line with equation $y = 3x - 7$ does not cross or touch the curve with equation $y = 2px^2 - 6px + 4p$, where p is a constant.

(a) Show that $4p^2 - 20p + 9 < 0$

(4)

(b) Hence find the set of possible values of p .

(4)

(Total for question = 8 marks)

Q11.

(a) On separate axes sketch the graphs of

(i) $y = -3x + c$, where c is a positive constant,

(ii) $y = \frac{1}{x + 5}$

On each sketch show the coordinates of any point at which the graph crosses the y -axis and the equation of any horizontal asymptote.

(4)

Given that $y = -3x + c$, where c is a positive constant, meets the curve $y = \frac{1}{x + 5}$ at two distinct points,

(b) show that $(5 - c)^2 > 2$

(3)

(c) Hence find the range of possible values for c .

(4)

(Total for question = 11 marks)

Q12.

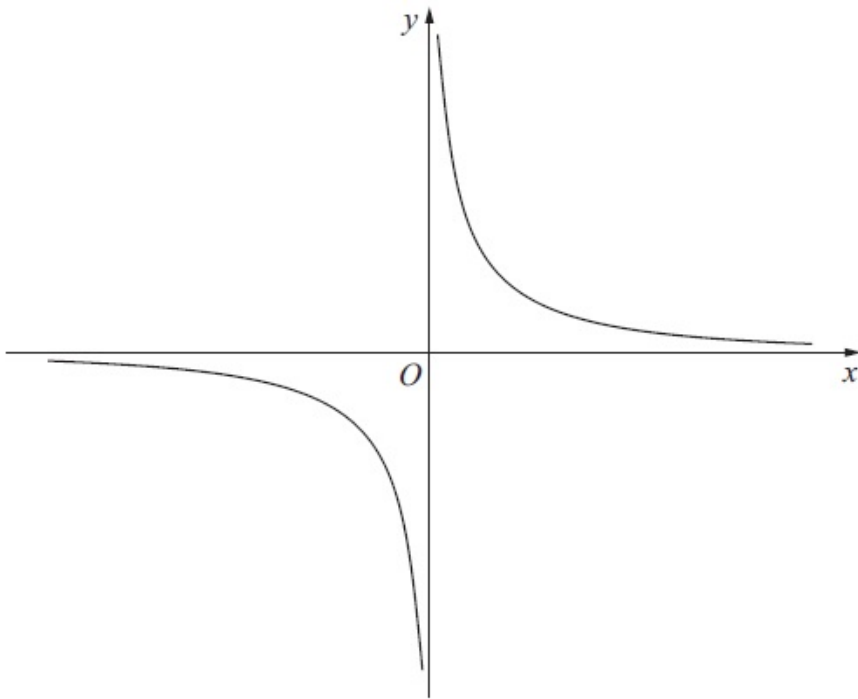


Figure 1

Figure 1 shows a sketch of the curve with equation $y = \frac{2}{x}, x \neq 0$

The curve C has equation $y = \frac{2}{x} - 5, x \neq 0$, and the line l has equation $y = 4x + 2$

(a) Sketch and clearly label the graphs of C and l on a single diagram.

On your diagram, show clearly the coordinates of the points where C and l cross the coordinate axes.

(5)

(b) Write down the equations of the asymptotes of the curve C .

(2)

(c) Find the coordinates of the points of intersection of $y = \frac{2}{x} - 5$ and $y = 4x + 2$

(5)

(Total 12 marks)