

Topic Y1 Polynomials and graphs (Pre-TT) [45]

1.

$$f(x) = 4x^3 - 12x^2 + 2x - 6$$

(a) Use the factor theorem to show that $(x - 3)$ is a factor of $f(x)$.

(2)

(b) Hence show that 3 is the only real root of the equation $f(x) = 0$

(4)

(Total 6 marks)

2.

Solve the simultaneous equations

$$y = 2(x - 2)^2, \quad 3x + y = 26. \quad [5]$$

(Total 5 marks)

3.

(i) Sketch the curve $y = \frac{1}{x^2}$. [2]

(ii) Hence sketch the curve $y = \frac{1}{(x - 3)^2}$. [2]

(iii) Describe fully a transformation that transforms the curve $y = \frac{1}{x^2}$ to the curve $y = \frac{2}{x^2}$. [3]

(Total 7 marks)

4.

(a) Factorise completely $x^3 + 10x^2 + 25x$

(2)

(b) Sketch the curve with equation

$$y = x^3 + 10x^2 + 25x$$

showing the coordinates of the points at which the curve cuts or touches the x -axis.

(2)

The point with coordinates $(-3, 0)$ lies on the curve with equation

$$y = (x + a)^3 + 10(x + a)^2 + 25(x + a)$$

where a is a constant.

(c) Find the two possible values of a .

(3)

(Total 7 marks)

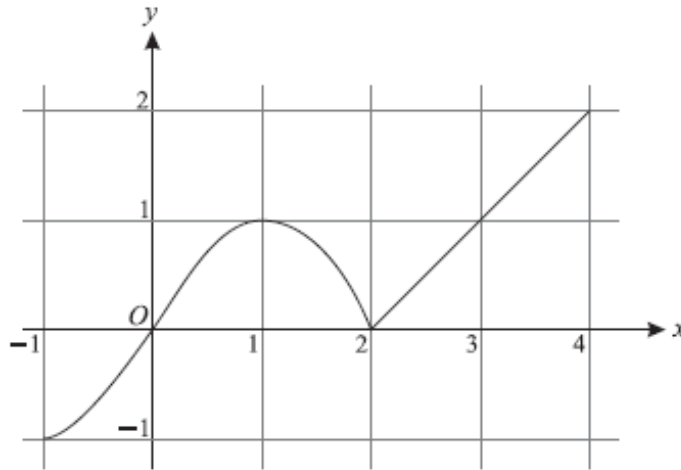
5.

(i) Find the quotient and the remainder when $3x^3 - 2x^2 + x + 7$ is divided by $x^2 - 2x + 5$. [4]

(ii) Hence, or otherwise, determine the values of the constants a and b such that, when $3x^3 - 2x^2 + ax + b$ is divided by $x^2 - 2x + 5$, there is no remainder. [2]

(Total 6 marks)

6.



The graph of $y = f(x)$ for $-1 \leq x \leq 4$ is shown above.

(i) Sketch the graph of $y = -f(x)$ for $-1 \leq x \leq 4$. [2]

(ii) The point $P(1, 1)$ on $y = f(x)$ is transformed to the point Q on $y = 3f(x)$. State the coordinates of Q . [2]

(iii) Describe the transformation which transforms the graph of $y = f(x)$ to the graph of $y = f(x + 2)$. [2]

(Total 6 marks)

7.

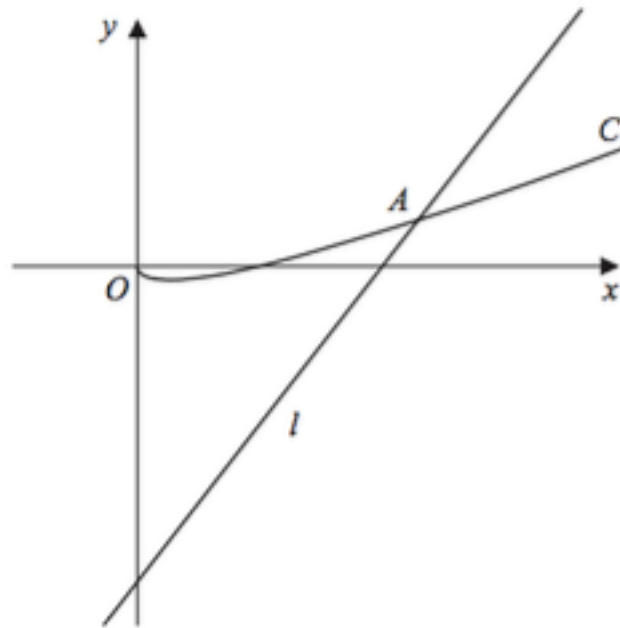


Figure 3

Figure 3 shows a sketch of the curve C with equation $y = 3x - 2\sqrt{x}$, $x \geq 0$ and the line l with equation $y = 8x - 16$

The line cuts the curve at point A as shown in Figure 3.

(a) Using algebra, find the x coordinate of point A .

(5)

(b)

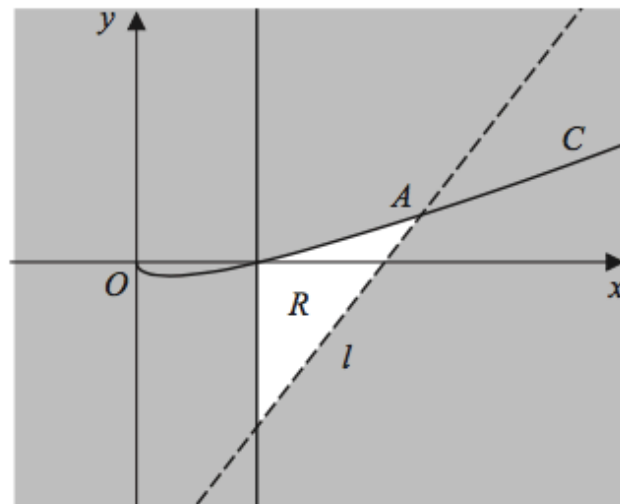


Figure 4

The region R is shown unshaded in Figure 4. Identify the inequalities that define R .

(3)

(Total 8 marks)