

8.

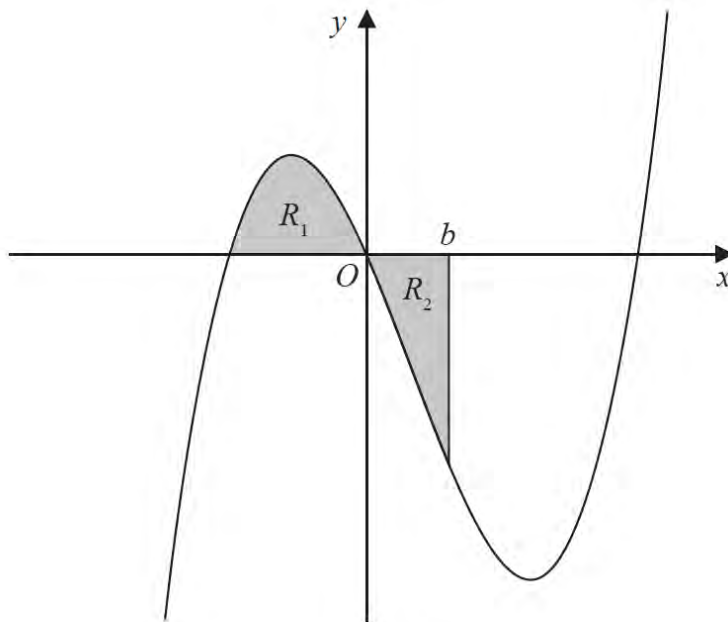


Figure 2

Figure 2 shows a sketch of part of the curve with equation  $y = x(x + 1)(x - 4)$

The region  $R_1$  shown shaded in Figure 2 is bounded by the curve and the negative  $x$ -axis.

(a) Show that the exact area of  $R_1$  is  $\frac{3}{4}$ .

(4)

The region  $R_2$  also shown shaded in Figure 2 is bounded by the curve, the positive  $x$ -axis and the line with equation  $x = b$ , where  $b$  is a positive constant and  $0 < b < 4$

Given that the area of  $R_1$  is equal to the area of  $R_2$

(b) verify that  $b$  satisfies the equation  $(b + 1)^2(b^2 - 6b + 3) = 0$

(4)

The roots of the equation  $b^2 - 6b + 3 = 0$  are  $b = 0.551$  and  $b = 5.449$ , to 3 decimal places.

The value of  $b$  for this new function is therefore 0.551 to 3 decimal places.

(c) Explain, with the aid of a diagram, the significance of the root 5.449.

(2)

(Total for Question 8 is 10 marks)