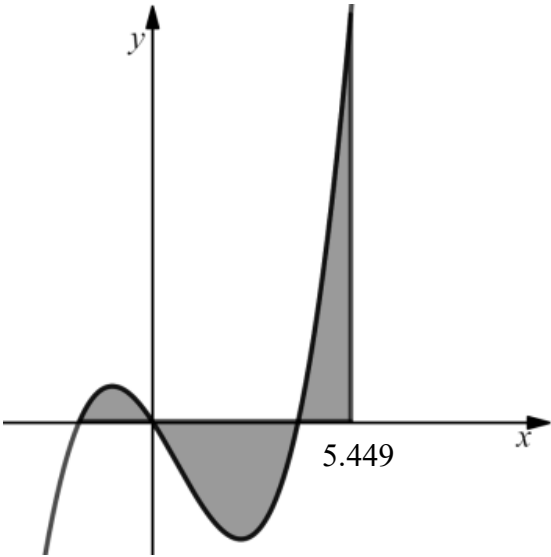


Question 8 (Total 10 marks)

Part	Working or answer an examiner might expect to see	Mark	Notes
(a)	$y = x(x + 1)(x - 4) = x^3 - 3x^2 - 4x$	B1	This mark is given for expanding brackets as a first step to a solution
	$\int_{-1}^0 (x^3 - 3x^2 - 4x) dx$	M1	This mark is given for a method to find the exact area of R_1
	$= \left[\frac{x^4}{4} - x^3 - 2x^2 \right]_{-1}^0$	M1	This mark is given for a method to evaluate the integral
	$= 0 - \left(\frac{1}{4} + 1 - 2 \right) = \frac{3}{4}$	A1	This mark is given for a full method to show the exact value of R_1
(b)	$\frac{b^4}{4} - b^3 - 2b^2 = -\frac{3}{4}$	M1	This mark is given for deducing the area of $R_2 = -\frac{3}{4}$
	$b^4 - 4b^3 - 8b^2 + 3 = 0$	A1	This mark is given for rearranging the equation to a quartic
	$(b^2 + 2b + 1)(b^2 - 6b + 3) = 0$	M1	This mark is given for expanding the equation given
	$b^4 - 4b^3 - 8b^2 + 3 = 0$ The two equations are the same, so verified	A1	This mark is for showing, and stating, that the equations are the same
(c)		B1	This mark is given for a sketch of the curve with $b = 5.449$ shown
	Between $x = -1$ and $b = 5.449$, the area above the x -axis is the same as the area below the x -axis	B1	This mark is given for a valid explanation of the significance of the root 5.449