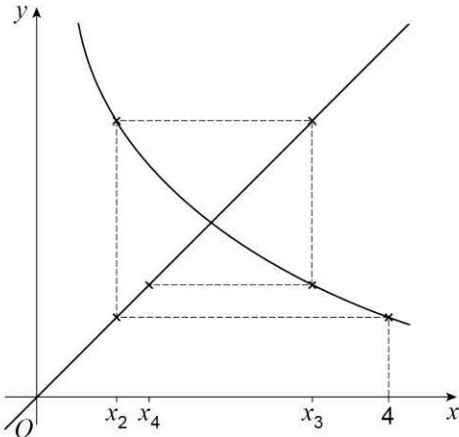


Q	Marking instructions	AO	Marks	Typical solution
14(a)	Rearranges the given equation to equal zero and evaluates their non-zero expression in the interval $[0,4]$ at least once. Must have equated to zero.	1.1a	M1	$x^3 = e^{6-2x} \Rightarrow x^3 - e^{6-2x} = 0$ Let $f(x) = x^3 - e^{6-2x}$ $f(0) = -403 < 0$ $f(4) = 63.86 > 0$ Hence α lies between 0 and 4
	Completes argument with two correct evaluations of their correct expression in the interval $[0,4]$ either side of the solution, with comparison to zero or a comment about change of sign. AND concludes that the solution α lies between 0 and 4 Evaluations must be correct to at least two significant figures rounded or truncated. Accept exact evaluation at $x = 0$.	2.1	R1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
14(b)	Uses natural logs to correctly remove exponential.	1.1a	M1	$x^3 = e^{6-2x}$ $\ln x^3 = 6 - 2x$ $3 \ln x = 6 - 2x$ $2x = 6 - 3 \ln x$ $x = 3 - \frac{3}{2} \ln x$
	Uses log rule or cube roots to remove power of 3.	1.1a	M1	
	Completes reasoned argument to show $x = 3 - \frac{3}{2} \ln x$ AG	2.1	R1	
	Subtotal		3	

Q	Marking instructions	AO	Marks	Typical solution
14(c)(i)	Obtains any correct value to at least 3 decimal places, ignoring labels.	1.1a	M1	$x_2 = 0.921$ $x_3 = 3.124$ $x_4 = 1.291$
	Obtains x_2 , x_3 and x_4 correct to at least 3 decimal places If no labels only accept the three correct answers in the correct order with no extras seen beyond x_4 $x_2 = 0.92055...$ $x_3 = 3.12416...$ $x_4 = 1.29125...$	1.1b	A1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
14(c)(ii)	Draws correct cobweb diagram Condone missing vertical line at $x = 4$	1.1a	M1	
	Shows positions of x_2 , x_3 and x_4 on the x -axis Accept correct values in place of x_n AWR T 0.92, 3.12 and 1.29 Do not accept labels on $y = x$ without indication on x -axis	1.1b	A1	
	Subtotal		2	

Q	Marking instructions	AO	Marks	Typical solution
14(c)(iii)	Explains that (it is not possible to evaluate x_2 as) $\ln 0$ has no value or that y is undefined OE	2.4	E1	It is not possible to evaluate x_2 as $\ln 0$ has no value
	Subtotal		1	

	Question 14 Total		10	
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