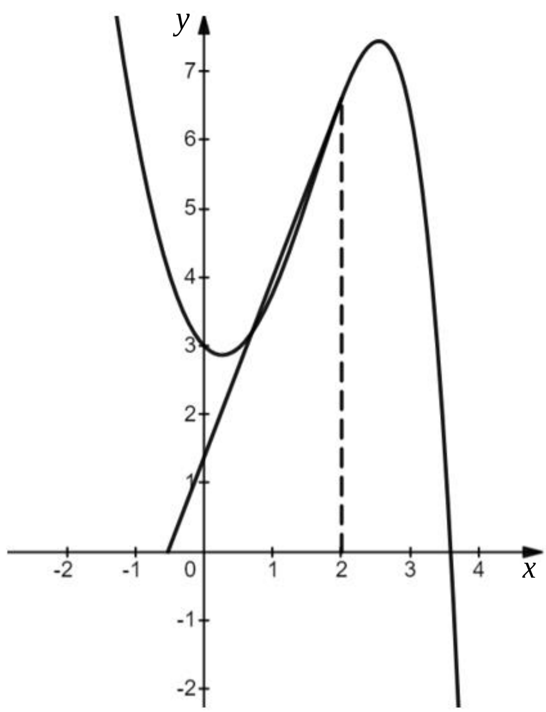
Question	Scheme	Marks	AOs
6(i)	There could be an even number of roots between 4 and 5.	B1	2.3
		(1)	
(ii)(a)	$g'(x) = 5x - e^x$	M1	1.1b
		A1	1.1b
		(2)	
(ii)(b)	Attempts $x_1 = 4 - \dfrac{2.5\times 4^2 - e^4 + 4}{"5\times 4 - e^4"}$ (NB $g(4) = -10.5\ldots$ and $g'(4) = -34.5\ldots$)	M1	1.1b
	$x_1 =$ awrt 3.69	A1	1.1b
		(2)	
(ii)(c)	 The second approximation is further away from α	B1	2.4
		(1)	
			(6 marks)

Notes:

(i)

B1: Explains that there could be e.g. two roots between 4 and 5.
It must be an **even** number of roots that the candidate suggests.
Alternatively, explains that the curve might not be continuous (in the interval).

(ii)(a)

M1: Attempts to differentiate. Look for $...x^2 \to ...x$ or $...e^x \to ...e^x$

A1: $g'(x) = 5x - e^x$

(ii)(b)

M1: Attempts $x_1 = 4 - \frac{g(4)}{g'(4)}$ to obtain a value following through on their $g'(x)$ as long as it is a "changed" function.

Must be a correct N-R formula used – may need to check their values.

There must be clear evidence that $4 - \frac{g(4)}{g'(4)}$ is being attempted.

A1: $x_1 = \text{awrt } 3.69$

(ii)(c)

B1: First iteration shown starting at $x = 2$ with

- a tangent to the curve at the point of intersection
- the tangent has a positive gradient meeting the *x*-axis to the left of 2
- minimal conclusion that the second approximation is further away from α