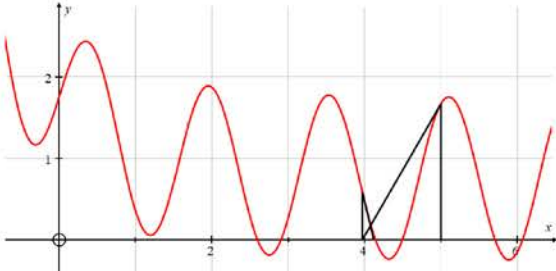| Question			Answer	Marks	AOs	Guidance	
8	(a)		Karim has a valid argument that there is a root between 5 and 6 because there is a change of sign on his table	E1 [1]	2.3	Argues from change of sign that this argument is valid	Allow argument is not valid as he does not state that the function is continuous
8	(b)		There are two roots between 2 and 3 (and/or between 4 and 5) so there is no change of sign in the table	E1 [1]	2.3	Allow for a comment that implies changes of sign are missed	
8	(c)	(i)	$f'(x) = 4\cos 4x - e^{-x}$ So N-R formula is $x_{n+1} = x_n - \dfrac{\sin 4x_n + e^{-x_n} + 0.75}{4\cos 4x_n - e^{-x_n}}$	M1 A1 [2]	1.1b 1.1b	Attempt to differentiate cao, but condone missing subscripts in the fraction	
8	(c)	(ii)	$\begin{array}{\|l\|l\|} \hline x_0 & 3 \\ \hline x_1 & 2.920853\ldots \\ \hline x_2 & 2.908274\ldots \\ \hline x_3 & 2.907846\ldots \\ \hline \end{array}$ The root is 2.908 to 4 s.f.	M1 A1 A1 [3]	1.1b 1.1b 2.2a	Produces at least two iterations Three iterations with correct values either rounded or truncated to at least 3 decimal places Correct to at least 3 s.f. FT their values if their sequence seems to converge	(root is 2.907845109 to 10 sf)
8	(d)	(i)		B1 B1 [2]	1.1b 1.1b	Attempt to draw a tangent at $x = 5$ as far as the x-axis Drawing the second tangent approximately at the point where $x = 3.97$ as far as the x-axis.	
8	(d)	(ii)	The start value is close to a stationary point, [so the gradient is very small] and the tangent meets the x-axis far away from the required root The sequence converges to a root, but not the required root	B1 B1 [2]	2.4 2.4	Conveys the idea that the stationary point or the value of the gradient causes the problem Conveys the idea that the wrong root is found	
8	(d)	(iii)	Use x_0 any value [between 5.28 and 5.85] which is nearer to the required root.	E1 [1]	2.4	Allow for a 'starting value between 5 and 6' oe	