

Question	Scheme	Marks	AOs
15(a)	Attempts to differentiate using the quotient rule or otherwise	M1	2.1
	$f'(x) = \frac{e^{\sqrt{2}x-1} \times 8 \cos 2x - 4 \sin 2x \times \sqrt{2} e^{\sqrt{2}x-1}}{(e^{\sqrt{2}x-1})^2}$	A1	1.1b
	Sets $f'(x) = 0$ and divides/ factorises out the $e^{\sqrt{2}x-1}$ terms	M1	2.1
	Proceeds via $\frac{\sin 2x}{\cos 2x} = \frac{8}{4\sqrt{2}}$ to $\Rightarrow \tan 2x = \sqrt{2}$ *	A1*	1.1b
		(4)	
(b)	(i) Solves $\tan 4x = \sqrt{2}$ and attempts to find the 2 nd solution	M1	3.1a
	$x = 1.02$	A1	1.1b
	(ii) Solves $\tan 2x = \sqrt{2}$ and attempts to find the 1 st solution	M1	3.1a
	$x = 0.478$	A1	1.1b
		(4)	

(8 marks)

Notes:

(a)

M1: Attempts to differentiate by using the quotient rule with $u = 4 \sin 2x$ and $v = e^{\sqrt{2}x-1}$ or alternatively uses the product rule with $u = 4 \sin 2x$ and $v = e^{1-\sqrt{2}x}$

A1: For achieving a correct $f'(x)$. For the product rule

$$f'(x) = e^{1-\sqrt{2}x} \times 8 \cos 2x + 4 \sin 2x \times -\sqrt{2} e^{1-\sqrt{2}x}$$

M1: This is scored for cancelling/ factorising out the exponential term. Look for an equation in just $\cos 2x$ and $\sin 2x$

A1*: Proceeds to $\tan 2x = \sqrt{2}$. This is a given answer.

(b) (i)

M1: Solves $\tan 4x = \sqrt{2}$ attempts to find the 2nd solution. Look for $x = \frac{\pi + \arctan \sqrt{2}}{4}$

Alternatively finds the 2nd solution of $\tan 2x = \sqrt{2}$ and attempts to divide by 2

A1: Allow awrt $x = 1.02$. The correct answer, with no incorrect working scores both marks

(b)(ii)

M1: Solves $\tan 2x = \sqrt{2}$ attempts to find the 1st solution. Look for $x = \frac{\arctan \sqrt{2}}{2}$

A1: Allow awrt $x = 0.478$. The correct answer, with no incorrect working scores both marks