Question Number	Scheme	Notes
8	$\int (2\cos x - \sin x)^2 \, dx = \int 5\sin^2(x - 1.107) \, dx$	M1
	$= \int \frac{5\{1 - \cos(2x - 2.21)\}}{2} dx$	M1
	$= \frac{5}{2}x - \frac{5\sin(2x - 2.21)}{4}$	M1
	$= \frac{5}{2}x + \frac{3\sin 2x}{4} + \cos 2x + c$	A1A1
		(5)
		Total 5

Question Number	Scheme	Marks
9(a)	$y=\sqrt{3+4\mathrm{e}^{x^2}}=\left(3+4\mathrm{e}^{x^2}\right)^{\frac{1}{2}}\Rightarrow\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{1}{2}\left(3+4\mathrm{e}^{x^2}\right)^{-\frac{1}{2}}\times 8x\mathrm{e}^{x^2}$	M1
	$=4x\mathrm{e}^{x^2}\left(3+4\mathrm{e}^{x^2}\right)^{-\frac{1}{2}}$	A1
		(2)
(b)	$\frac{\left(3+4\mathrm{e}^{x^2}\right)^{\frac{1}{2}}}{x}=4x\mathrm{e}^{x^2}\left(3+4\mathrm{e}^{x^2}\right)^{-\frac{1}{2}}$	M1
	$\frac{\left(3+4\mathrm{e}^{x^2}\right)}{x}=4x\mathrm{e}^{x^2}$	dM1
	$4x^2\mathrm{e}^{x^2}-4\mathrm{e}^{x^2}-3=0*$	A1*
		(3)
(c)	$\mathrm{f}(x)=4x^2\mathrm{e}^{x^2}-4\mathrm{e}^{x^2}-3\Rightarrow\mathrm{f}(1)=-3\quad\text{AND}\quad\mathrm{f}(2)=652\cdot\ldots$	M1
	Change of sign and f (x) is continuous hence root in (1, 2)	A1
		(2)
(d)	$4x^2\mathrm{e}^{x^2}-4\mathrm{e}^{x^2}-3=0\Rightarrow x^2=\frac{4\mathrm{e}^{x^2}+3}{4\mathrm{e}^{x^2}}=\frac{4+3\mathrm{e}^{-x^2}}{4}\Rightarrow x=\frac{1}{2}\sqrt{4+3\mathrm{e}^{-x^2}}$ *	B1*
		(1)
(e)(i)	$x_1=1\Rightarrow x_2=\frac{1}{2}\sqrt{4+3\mathrm{e}^{-1}}$	M1
	$x_3=1.0997$	A1
(ii)	$\alpha=1.1051$	A1
		(3)
		Total 11

(a)

M1: Differentiates using the chain rule to obtain $kx\mathrm{e}^{x^2}\left(3+4\mathrm{e}^{x^2}\right)^{-\frac{1}{2}}$ OR $k\mathrm{e}^{x^2}\left(3+4\mathrm{e}^{x^2}\right)^{-\frac{1}{2}}$

If they are using implicit differentiation accept $\frac{kx\mathrm{e}^{x^2}}{y}$ or $\frac{k\mathrm{e}^{x^2}}{y}$

A1: Correct derivative in simplest form. Also award for $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{4x\mathrm{e}^{x^2}}{y}$ o.e. simplified answer

(b)

M1: Sets their $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{\left(3+4\mathrm{e}^{x^2}\right)^{\frac{1}{2}}}{x}$ or equivalent such as use of $y=mx$ with $m=$ their $\frac{\mathrm{d}y}{\mathrm{d}x}$ and $y=\left(3+4\mathrm{e}^{x^2}\right)^{\frac{1}{2}}$.

Allow with another variable $x\to\alpha$

dM1: Multiplies up to eliminate the square root. Allow a consistent use of another variable $x\to\alpha$

Dependent upon the previous M1 and a suitable $\frac{\mathrm{d}y}{\mathrm{d}x}$, that is one of the form that scored an M1 in part (a)