8(a)	Starting with the LHS: $2\text{cosec}^2 2\theta(1-\cos 2\theta) = \dfrac{2-2\cos 2\theta}{\sin^2 2\theta}$	M1
	$= \dfrac{2-2(1-2\sin^2\theta)}{4\sin^2\theta\cos^2\theta}$	M1dM1
	$= \sec^2\theta = 1+\tan^2\theta \equiv \text{RHS}$ *	A1*
		(4)
(b)	$\sec^2 x - 3\sec x - 4 = 0 \Rightarrow \sec x = \ldots$	M1
	$\cos x = \dfrac{1}{4}$ (ignore -1)	A1
	$\cos x = \dfrac{1}{4} \Rightarrow x = \ldots$	dM1
	$x = 75.5°, 284.5°$	A1
		(4)
		(8 marks)

2	Use correct product rule $\cos 2x$ may be $1 - 2\sin^2 x$ or …	**M1**	$ae^{2x}\sin 2x + e^{2x}b\cos 2x$. Need a or $b = 2$. Allow M1 if only error is e^x instead of e^{2x} in one of terms, then maximum 1/5.
	Obtain correct derivative $2e^{2x}\sin 2x + 2e^{2x}\cos 2x$	**A1**	OE, e.g. $4e^{2x}\sin x\cos x + 2e^{2x}\left(\cos^2 x - \sin^2 x\right)$.
	Equate derivative of the form $ae^{2x}\sin 2x + e^{2x}b\cos 2x$ to 0 and solve for $2x$ or x using a correct method Note may have substituted for $\sin 2x$ and/or $\cos 2x$	**M1**	Obtain $2x = \tan^{-1}(-$ *their b/their a*$)$ OE. Allow one slip in rearranging. Allow degrees. Variety of other methods available, such as solving quadratic equation in $\sin x$ or $\tan x$ e.g. $\tan^2 x - 2\tan x - 1 = 0$ leading to $x = \tan^{-1}(1+\sqrt{2})$.
	Obtain $x = \frac{3}{8}\pi$ only or exact equivalent	**A1**	CWO 67.5° gets A0. Ignore any answers outside interval $0 \leqslant x \leqslant \dfrac{\pi}{2}$.
	Obtain $y = \dfrac{1}{2}\sqrt{2}e^{\frac{3}{4}\pi}$ only or exact simplified equivalent	**A1**	CWO, ISW. Not $\sin\left(\dfrac{3}{4}\pi e^{\frac{3}{4}\pi}\right)$. Ignore any answers using x outside interval $0 \leqslant x \leqslant \dfrac{\pi}{2}$.

Question	Answer	Marks	Guidance
7(a)	Use chain rule to differentiate LHS	*M1	
	Obtain $\dfrac{1}{x+y}\left(1+\dfrac{dy}{dx}\right)$	A1	
	Equate derivative of LHS to $1 - 2\dfrac{dy}{dx}$ and solve for $\dfrac{dy}{dx}$	DM1	
	Obtain the given answer correctly	A1	
		4	
7(b)	State $x + y = 1$	B1	
	Obtain or imply $x - 2y = 0$	B1	
	Obtain coordinates $x = \dfrac{2}{3}$ and $y = \dfrac{1}{3}$	B1	
		3	