8. (a) Prove that

$$2\operatorname{cosec}^2 2\theta(1-\cos 2\theta) \equiv 1+\tan^2\theta$$

(4)

(b) Hence solve for $0 < x < 360°$, where $x \neq (90n)°$, $n \in \mathbb{N}$, the equation

$$2\operatorname{cosec}^2 2x(1-\cos 2x) = 4+3\sec x$$

giving your answers to one decimal place.

(*Solutions relying entirely on calculator technology are not acceptable.*)

(4)

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2 Find the exact coordinates of the stationary point of the curve $y = e^{2x}\sin 2x$ for $0 \leqslant x \leqslant \frac{1}{2}\pi$. [5]

7 The equation of a curve is $\ln(x+y) = x - 2y$.

(a) Show that $\dfrac{dy}{dx} = \dfrac{x+y-1}{2(x+y)+1}$. [4]

(b) Find the coordinates of the point on the curve where the tangent is parallel to the x-axis. [3]