Question number	Scheme	Marks
9	$u = \mathrm{e}^{-t} \qquad v = \sin 2t$ $u' = -\mathrm{e}^{-t} \qquad v' = 2\cos 2t$ $\dfrac{\mathrm{d}x}{\mathrm{d}t} = 2\mathrm{e}^{-t}\cos 2t - \mathrm{e}^{-t}\sin 2t = 2\mathrm{e}^{-t}\cos 2t - x$ $u = 2\mathrm{e}^{-t} \qquad v = \cos 2t$ $u' = -2\mathrm{e}^{-t} \qquad v' = -2\sin 2t$ $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2} = -4\mathrm{e}^{-t}\sin 2t - 2\mathrm{e}^{-t}\cos 2t - \dfrac{\mathrm{d}x}{\mathrm{d}t}$ $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2} = -4x - \left(\dfrac{\mathrm{d}x}{\mathrm{d}t} + x\right) - \dfrac{\mathrm{d}x}{\mathrm{d}t} = -5x - 2\dfrac{\mathrm{d}x}{\mathrm{d}t}$ $\therefore \dfrac{\mathrm{d}^2x}{\mathrm{d}t^2} + 2\dfrac{\mathrm{d}x}{\mathrm{d}t} + 5x = 0 \quad *$	M1 A1 A1 M1 A1 dM1 dM1 A1 cso **[8]**

	Notes
M1	For an attempt to differentiate using the product rule. Must have 2 terms added together.
A1	For one correct term
A1	For two correct terms
M1	Attempts to differentiate $\dfrac{\mathrm{d}x}{\mathrm{d}t}$
A1	For $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2} = -4\mathrm{e}^{-t}\sin 2t - 2\mathrm{e}^{-t}\cos 2t - \dfrac{\mathrm{d}x}{\mathrm{d}t}$ oe
dM1	Dependant on previous M mark - for substitution of x and $\dfrac{\mathrm{d}x}{\mathrm{d}t}$ into $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2}$ or for substitution of $x, \dfrac{\mathrm{d}x}{\mathrm{d}t}$ and $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2}$ into the given equation
dM1	Dependant on previous M mark - for simplifying to $\dfrac{\mathrm{d}^2x}{\mathrm{d}t^2} = -5x - 2\dfrac{\mathrm{d}x}{\mathrm{d}t}$ oe or All 5 correct terms seen and an attempt to simplify (5 correct terms may be implied by 7 correct terms)
A1 cso	Obtains the given equation or clear working to show that the equation = 0