Question			Answer	Marks	AO	Guidance	
8	(a)			M1*	2.1	Differentiates y with respect to x – answer of the form $\pm e^{-2x} \pm \lambda x e^{-2x}$	$\lambda \neq 0$
			$y' = e^{-2x}(1-2x)$	A1	1.1		
			$y'' = e^{-2x}(-4+4x)$	A1ft	1.1	Follow through their first derivative	
				M1dep*	3.1a	Solves $y''=0$ (or attempts to verify $y''=0$ by substituting $x=1$) **or** considers sign change either side of y''	
			$y''=0$ at $x=1$ and $y''(0.5) = -2e^{-1} < 0$, $y''(1.5) = 2e^{-3} > 0$ (so change of sign indicates a point of inflection at $x=1$)	A1 **[5]**	2.2a	Conclusion not required for this mark	
8	(b)		$\int xe^{-2x}dx = -\frac{1}{2}xe^{-2x} + \frac{1}{2}\int e^{-2x}dx$	M1*	2.1	Integration by parts – of the form $\pm\alpha xe^{-2x} \pm \beta\int e^{-2x}dx$	Where $\alpha, \beta = 2, \frac{1}{2}$
			$\int xe^{-2x}dx = -\frac{1}{2}xe^{-2x} - \frac{1}{4}e^{-2x}$	A1	1.1		
			$\int_0^1 xe^{-2x}dx = \left[-\frac{1}{2}xe^{-2x} - \frac{1}{4}e^{-2x}\right]_0^1$ $= \left(-\frac{1}{2}e^{-2} - \frac{1}{4}e^{-2}\right) - \left(0 - \frac{1}{4}\right)$	M1dep*	1.1	Use of correct limits in their fully integrated expression – need not be simplified (or equivalent)	
			$\frac{1}{4} - \frac{3}{4}e^{-2}$	A1	1.1	Allow unsimplified	
			Area of triangle below $OP = \frac{1}{2}e^{-2}$	B1	1.1	Or by correctly evaluating $\int_0^1 e^{-2}x\,dx$	Allow unsimplified
			$= \frac{1}{4}\left(1 - 5e^{-2}\right)$	A1 **[6]**	2.2a	$a=1,\ b=-5$ (must be in this form)	