9 A curve has equation $y = xe^{2x}$.

(a) Find $\frac{dy}{dx}$. [2]

(b) Find the equation of the normal to the curve at $x = 1$. [4]

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(c) Use your answer to **part (a)** to find the exact value of $\int_0^2 2xe^{2x}\,dx$. [5]