**9** The equation of a curve is $y = kxe^{-2x}$, where $k$ is a constant.

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

**(b)** Find the coordinates of the stationary point on the curve $y = 10xe^{-2x}$. [3]

**(c)** Use your answer to **part (a)** to find $\int 4xe^{-2x}dx$. [3]

**(d)** Find the exact value of $\int_0^1 4xe^{-2x}dx$. [2]