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Q3) $\frac{dy}{dx} + 4xy = e^{-2x^2}$, $y(0) = -4.3$

$I.F = e^{\int 4x\,dx} = e^{4\int x\,dx} = e^{4\left(\frac{x^2}{2}\right)} = e^{2x^2}$

$y\left(e^{2x^2}\right) = \int e^{-2x^2} \cdot e^{2x^2}\,dx$

$y\left(e^{2x^2}\right) = \int dx \Rightarrow y\left(e^{2x^2}\right) = x + c$

If $x = 0$, $y = -4.3$

$-4.3\,(e^0) = c$

$c = -4.3$

$y\left(e^{2x^2}\right) = x - 4.3$

$\Rightarrow e^{-2x^2}\,(x - 4.3)$

$y = e^{-2x^2}\,(x - 4.3)$