

Comparing the given equation,  $y' + 2y = 2e^{2x}$ , with the general form,  $y' + P(x)y = Q(x)$ , we see that  $P(x) = 2$  and the integrating factor is  $I(x) = e^{\int P(x)dx} = e^{\int 2 dx} = e^{2x}$ . Multiplying the differential equation by  $I(x)$  gives  $e^{2x}y' + 2e^{2x}y = 2e^{4x} \Rightarrow (e^{2x}y)' = 2e^{4x} \Rightarrow e^{2x}y = \int 2e^{4x} dx \Rightarrow e^{2x}y = \frac{2}{4}e^{4x} + C \Rightarrow y = \frac{1}{2}e^{2x} + Ce^{-2x}$ .