Form: $y' + P(x)y = Q(x)$

2. $y' \underbrace{-4}_{P(x)} y = x^2 e^{4x}$

② IF

$\mu(x) = e^{\int P(x)\,dx}$

$= e^{\int -4\,dx}$

$= e^{-4x}$

③ $e^{-4x}(y' - 4y) = e^{-4x}(x^2 e^{4x})$

$\underbrace{e^{-4x}}_{Q}\ \underbrace{y'}_{P'} \underbrace{-4e^{-4x}}_{Q'}\ \underbrace{y}_{P} = x^2$

④ $\frac{d}{dx}\left[y e^{-4x}\right] = x^2$

⑤ $\int \frac{d}{dx}\left[y e^{-4x}\right] dx = \int x^2\,dx$

$y e^{-4x} = \frac{1}{3}x^3 + C$

$\frac{y e^{-4x}}{e^{-4x}} = \frac{x^3}{3e^{-4x}} + \frac{C}{e^{-4x}}$

$y = \frac{1}{3}x^3 e^{4x} + Ce^{4x}$