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

6. $y' + \underbrace{3x^2}_{P(x)} y = 3x^2 e^{-x^3}$

② I.F.

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

$= e^{\int 3x^2\,dx}$

$= e^{x^3}$

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

④ $\underbrace{e^{x^3}}_{Q}\underbrace{y'}_{P'} + \underbrace{3x^2 e^{x^3}}_{Q'}\underbrace{y}_{P} = 3x^2$

$\frac{d}{dx}[y e^{x^3}] = 3x^2$

⑤ $\int \frac{d}{dx}[y e^{x^3}]\,dx = \int (3x^2)\,dx$

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

$y e^{x^3} = x^3 + C$

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

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