

Solve the differential equation $x \frac{dy}{dx} - y = x^2 \sin x$. [103 清大生醫甲 5(a)]

[解]原式 $\Rightarrow y' - \frac{1}{x} y = x \sin x$

$$F = e^{\int -\frac{1}{x} dx} = x^{-1}$$

$$y = \frac{1}{F} \left(\int F \cdot x \sin x dx + C \right) = x \left(\int x^{-1} \cdot x \sin x dx + C \right) = x(-\cos x + C)$$

$$y = Cx - x \cos x$$

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