

You must show all your work to receive credit. Calculators are allowed.

Problem 1: (3 points) Find the general solution to

$$\frac{dy}{dx} = \frac{-2y + \cos(x^2)}{x}$$

$$\frac{dy}{dx} + \frac{2}{x}y = \frac{\cos(x^2)}{x}$$

$$I(x) = e^{\int \frac{2}{x} dx} = e^{\ln|x| \cdot 2} = |x|^2 = x^2$$

$$\Rightarrow \frac{d}{dx} (x^2 y) = x^2 \cdot \frac{\cos(x^2)}{x} = x \cos(x^2)$$

$$x^2 y = \int x \cos(x^2) dx = \frac{1}{2} \sin(x^2) + C$$

$$y = \frac{1}{2x^2} \sin(x^2) + \frac{C}{x^2}$$