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Opt: Mechanical Engr.

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1. $y = \dfrac{2\cos 3x}{x^2}$

$\dfrac{dy}{dx} = \dfrac{\sin^2 3}{2x^{2-1}}$

$\dfrac{dy}{dx} = \dfrac{\sin^2 3}{2x}$

$\dfrac{dy}{dx} = 6x\sin^2$

2. $y = xe^{2x}$

$\dfrac{d^2y}{dx^2} = \dfrac{4dy}{dx} - 4$

$\dfrac{d^2y}{4dx^2} = \dfrac{dy}{dx} - 1$

$\dfrac{dy}{dx}$ or $(xe^{2x}) = 2xe^{2x-1}$

$\dfrac{dy}{dx} = 1 + \dfrac{d^2y}{4dx^2}$

$2xe^{2x-1} = 1 + \dfrac{d^2y}{4dx^2}$

$8xe^{2x-1} = 1 + \dfrac{d^2y}{dx^2}$

$\dfrac{dy}{dx} = 64xe^{2x-1} - 1$

4. $y = e^x \sin 2x$

$\dfrac{dy}{dx} = e^x \cos^2 2^{x-1}$

$$\frac{dy}{dx} = e^{(x)} \cos^2 (2^{x-1})$$

$$\frac{dy}{dx} = \cos^2 e \, 2$$

$$\frac{dy}{dx} = 2\cos^2 e$$