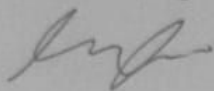


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① $f(x) = \cos(x) e^{\cos(x^2)}$

$$f'(x) = -\sin(x) e^{\cos(x^2)} + \cos(x^2) e^{\cos(x^2)} \cdot -\sin(x^2) \cdot 2x$$

② $\frac{\ln(y^2)}{x} + e^{xy} + \csc^2(x) = 1$

$$\frac{\frac{2y}{y^2} dy}{x^2} + e^{xy} (y + x dy) + (-2 \csc(x) \cot(x)) = 0$$

$$\frac{\frac{2x}{y} dy}{x^2} - \frac{\ln(y^2)}{x^2} + \frac{xy e^{xy} + x^2 y e^{xy} dy}{x^2} - 2 \csc^2(x) \cot(x)$$

$$\frac{2}{xy} dy$$

$$\frac{\frac{2x}{y} \frac{dy}{dx} - \ln(y^2)}{x^2} - e^{xy} (y + x \frac{dy}{dx}) - 2 \csc^2 x \cot x = 0$$

$$\frac{\frac{2dy}{xy} - \frac{\ln(y^2)}{x^2} - ye^{xy} - x e^{xy} \frac{dy}{dx} - 2 \csc^2 x \cot x = 0$$

$$\frac{2}{xy} \frac{dy}{dx} - x e^{xy} \frac{dy}{dx} = \frac{\ln(y^2)}{x^2} + ye^{xy} + 2 \csc^2 x \cot x$$

$$\frac{dy}{dx} = \frac{\frac{\ln(y^2)}{x^2} + ye^{xy} + 2 \csc^2 x \cot x}{\left(\frac{2}{xy} - x e^{xy}\right)}$$

$$3. \quad dt = \frac{1}{2} d(2t)$$

$$\int \frac{\sin^3(2t)}{\csc(2t)} dt = \frac{1}{2} \int \frac{\sin^3(2t)}{\csc(2t)} d(2t) \rightarrow \csc = \frac{1}{\sin}$$

$$= \frac{1}{2} \int \sin^4(2t) d(2t) \rightarrow 2t = x$$

$$= \frac{1}{2} \int \left(\frac{1 - \cos 2x}{2} \right)^2 dx$$

$$= \frac{1}{8} \int \cos^2 2x - 2 \cos 2x + 1 dx$$

$$= \frac{1}{8} \left(\left(\int \frac{1 + \cos 4x}{2} dx \right) - \sin 2x + x \right) + C$$

$$= \frac{1}{8} \left(\frac{1}{2} x + \frac{1}{8} \sin 4x - \sin 2x + x \right) + C$$

$$= \frac{3}{16} x - \frac{\sin 2x}{8} + \frac{1}{64} \sin 4x = \frac{3}{8} t - \frac{\sin 4t}{8} + \frac{\sin 8t}{64} + C$$

$$4. \quad \int \frac{1}{(x-2)(x+1)} dx = \int \frac{1}{3 \cancel{(x-2)}} - \frac{1}{3 \cancel{(x+1)}} dx$$

$$= \frac{1}{3} \int \frac{1}{\cancel{x-2}} - \frac{1}{\cancel{x+1}} dx = \frac{1}{3} (\ln |\cancel{x-2}| - \ln |\cancel{x+1}|) + C$$

$$5. \quad \text{misal } x-9 = t^2 \rightarrow dx = 2t dt$$

$$2x = 2(t^2 + 9)$$

$$\int \frac{2x}{\sqrt{x-9}} dx = \int (t^2 + 9) dt = \int \left(\frac{1}{3} t^3 + 9t \right)$$

$$= \frac{4}{3} t^3 + 36t + C = \frac{4}{3} t^3 + 36t + C$$

$$\left[\frac{4}{3} (x-9)^{3/2} + 36 \sqrt{x-9} \right] + C$$

$$\textcircled{6} \quad \frac{4}{3} (x-9)^{\frac{3}{2}} + 36 (x-9)^{\frac{1}{2}} + C$$