



$$a) y = e^{2x}$$

$$y = 2e^{2x} \cdot dx$$

$$y = 2e^{2x}$$

~~graph~~

$$y - y_1 = m(x - x_1)$$

$$y - 1 = 2e^{2x}(x - 0)$$

$$2xe^{2x} - y + 1 = 0.$$

$$b) x \sin x$$

$$v \frac{du}{dx} + u \frac{dv}{dx}$$

$$= \sin x$$

$$u = x$$

$$v = \sin x$$

$$u' = 1$$

$$v' = \cos x$$

$$= \sin x \cdot 1 + x \cdot \cos x$$

~~product rule~~

$$= \sin x + x \cos x.$$

~~v'u' + u'v~~

$$ii) \frac{\ln x}{x^2}$$

$$= \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

$$u = \ln x$$

$$v = x^2$$

$$u' = \frac{1}{x}$$

$$v' = 2x$$

$$= \frac{x^2 \cdot \frac{1}{x} - \ln x \cdot 2x}{x^4}$$

$$= \frac{x^3 - 2x \ln x}{x^4}$$

$$= \frac{x(x^2 - 2 \ln x)}{x^4}$$

$$= \frac{x^2 - 2 \ln x}{x^3}$$



c)

$$d) i) \int \cos 3x \, dx$$

$$= \sin 3x$$

~~$$ii) \int (e^{5x} - 1) \, dx$$~~

~~$$= \frac{1}{5}(5e^{5x}) - x$$~~

$$ii) \int (e^{5x} - 1)$$

$$\frac{1}{5} e^{5x} - x$$