

OMYESSON MAXWELL OSOMDU

191EMG041046

MAT104

1) $3te^{2t}$

$$y = 3te^{2t}$$

$$\ln(y) = \ln(3t) + \ln(e^{2t})$$

$$\frac{1}{y} \left(\frac{dy}{dt} \right) = \frac{1}{3t} \cdot 3 + \frac{1}{e^{2t}} \cdot 2e^{2t}$$

$$\frac{dy}{dx} = y \left[\frac{3}{3t} + \frac{2e^{2t}}{e^{2t}} \right]$$

$$\frac{dy}{dx} = y \left[\frac{1}{t} + 2 \right]$$

$$\frac{dy}{dx} = 3te^{2t} \left[\frac{1}{t} + 2 \right]$$

2) $x^2 \sin x$

$$y = x^2 \sin x$$

$$\ln(y) = \ln(x^2) + \ln(\sin x)$$

$$\frac{1}{y} \left(\frac{dy}{dx} \right) = \frac{1}{x^2} \cdot 2x + \frac{1}{\sin x} \cdot \cos x$$

$$\frac{dy}{dx} = y \left[\frac{2x}{x^2} + \frac{\cos x}{\sin x} \right]$$

$$\frac{dy}{dx} = y \left[\frac{2}{x} + \frac{\cos x}{\sin x} \right]$$

$$\frac{dy}{dx} = x^2 \sin x \left[\frac{2}{x} + \cot x \right]$$

3) $\sin 7x \cos 2x$

$$y = \sin 7x \cos 2x$$

$$\ln(y) = \ln(\sin 7x) + \ln(\cos 2x)$$

$$\frac{1}{y} \left(\frac{dy}{dx} \right) = \frac{1}{\sin 7x} \cdot 7 \cos 7x + \frac{1}{\cos 2x} \cdot (-2 \sin 2x)$$

$$\frac{dy}{dx} = y \left[\frac{7 \cos 7x}{\sin 7x} + \frac{(-2 \sin 2x)}{\cos 2x} \right]$$

$$\frac{dy}{dx} = \sin 7x \cos 2x \left[\frac{7 \cos 7x}{\sin 7x} - \frac{2 \sin 2x}{\cos 2x} \right]$$

4) $(2x-3x^2)/(1-x)$

$$y = \frac{(2x-3x^2)}{1-x}$$

$$\ln(y) = \ln(2x-3x^2) - \ln(1-x)$$

$$\frac{1}{y} \left(\frac{dy}{dx} \right) = \frac{1}{2x-3x^2} \cdot (2-6x) - \frac{1}{1-x} \cdot (-1)$$

$$\frac{dy}{dx} = y \left[\frac{2-6x}{2x-3x^2} + \frac{1}{1-x} \right]$$

$$\frac{dy}{dx} = \frac{(2x-3x^2)}{1-x} \left[\frac{2-6x}{2x-3x^2} + \frac{1}{1-x} \right]$$