

UBANI, JOSEPH IKECHUKWU

COMPUTER ENGINEERING

19/ENG02/066

MAT 104

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$y = 2 \cos 3x - u$

$$\frac{dy}{dx} = \frac{d(2 \cos 3x)}{dx} - \frac{du}{dx}$$
$$= 2 \frac{d \cos 3x}{dx} - \frac{du}{dx}$$
$$= 2 \frac{d \cos p}{dp} \cdot \frac{dp}{dx} - \frac{du}{dx}$$
$$= 2 (-\sin p) \cdot 3 - \frac{du}{dx}$$
$$= -6 \sin p - \frac{du}{dx}$$
$$= -6 \sin 3x - \frac{du}{dx}$$

$u = 2 \cos 3x$   
 $\text{let } 3x = p$   
 $\frac{dp}{dx} = 3$   
 $u = 2 \sin p$   
 $\frac{du}{dp} = 2 \cos p$   
 $\frac{du}{dx} = \frac{du}{dp} \times \frac{dp}{dx}$   
 $\frac{du}{dx} = 2 \cos p \cdot 3$   
 $\frac{du}{dx} = 6 \cos p$   
 $\frac{du}{dx} = 6 \cos 3x$

$v = x^3$   
 $\frac{dv}{dx} = 3x^2$

$$\frac{dy}{dx} = \frac{x^6 \cdot 6 \cos 3x + 2 \cos 3x \cdot 3x^2}{(x^3)^2}$$

$$\frac{dy}{dx} = \frac{6 \cos 3x^4 + 2 \cos 3x \cdot 3x^2}{x^6}$$

$$\frac{dy}{dx} = \frac{6 \cos 3x^4}{x^6} + \frac{2 \cos 3x \cdot 3x^2}{x^4}$$

$$\frac{dy}{dx} = \frac{6 \cos 3x^4}{x^6} + \frac{2 \cos 3x \cdot 3}{x^2}$$

$$\frac{dy}{dx} = \frac{6 \cos 3x^4}{x^6} + \frac{6 \cos 3x}{x^2} //$$

2)  $y = x e^{2x}$   
 $\frac{dy}{dx} = ?$

$u = x, \frac{du}{dx} = 1,$

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

$$\frac{dv}{dx} = 2e^{2x}$$

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

$$\frac{dy}{dx} = x \cdot 2e^{2x} + e^{2x} \cdot 1$$

$$\frac{dy}{dx} = 2x e^{2x} + e^{2x}$$

$$\frac{dy}{dx} = e^{2x} + 2x e^{2x}$$

$$\frac{dy}{dx} = (1+2x) e^{2x} //$$

$\frac{d^2y}{dx^2}$  of  $(1+2x) e^{2x}$

$u = 1+2x$   
 $\frac{du}{dx} = 2$

$v = e^{2x}, \frac{dv}{dx} = 2e^{2x}$

$$\frac{d^2y}{dx^2} = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$\frac{d^2y}{dx^2} = (1+2x) 2e^{2x} + e^{2x} \cdot 2$$

$$\frac{d^2y}{dx^2} = 2e^{2x} + 4x e^{2x} + 2e^{2x}$$

$$\frac{d^2y}{dx^2} = 2e^{2x} + 4x e^{2x}$$

$$\frac{d^2y}{dx^2} = (1+2x+1) 2e^{2x}$$

$$\frac{d^2y}{dx^2} - 4 \frac{dy}{dx} + 4y = 0$$

$$4 \frac{dy}{dx} = 4(e^{2x} + 2x e^{2x})$$

$$= 4e^{2x} + 8x e^{2x}$$

$$4y = 4x e^{2x},$$

$$\frac{dy}{dx} - 4y/x + 4y = 0$$

$$2e^{2x} dx e^{2x} + 2e^{2x} = 4e^{2x} + 8xe^{2x} dx e^{2x}$$

$$4e^{2x} dx e^{2x} = 4e^{2x} + 8xe^{2x} dx e^{2x}$$

$$8xe^{2x} - 8xe^{2x} = 0 //$$

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$$4 \int e^x \sin 2x dx$$

$$U = \sin 2x, \quad dv = e^x$$

$$du = 2 \cos 2x, \quad V = e^x$$

$$\int u dv = UV - \int v du$$

$$= \sin 2x e^x - \int e^x 2 \cos 2x dx$$

$$= e^x \sin 2x - 2 \int e^x \cos 2x dx$$