Implicit differentiation

$f(x) = 3\cos(\underbrace{2x^2}_{y})$

find $f'(x)$

$-3\sin y \cdot \frac{dy}{dx}$

Now find f '(x) if...

f(x) = 3cos(2y)

$$-6\sin 2y \cdot \frac{dy}{dx}$$

Now find f '(x) if...

$$e^x + \underbrace{x}_{u} \cdot \underbrace{\sin y}_{v} = \cos 2y$$

$$e^x + \sin y + x \cdot \cos y \cdot \frac{dy}{dx} = -2\sin 2y \cdot \frac{dy}{dx}$$

$$e^x + \sin y = -2 \sin 2y \frac{dy}{dx} - x \cos y \frac{dy}{dx}$$

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

$$\frac{-(e^x + \sin y)}{2 \sin 2y + x \cos y} = \frac{+dy}{dx} = 0$$

Now find f '(x) if...

$$(y)^3 + 3x(y)^2 - x^3 = 27$$

$$y^3 + 3(y)\cdot y^2 - (y)^3 = 27$$

$$4y^3 - y^3 = 27$$

$$3y^3 = 27$$

$$y^3 = 9$$

$$\boxed{y = \sqrt[3]{9}}$$

$$\underbrace{3x}_{u}\underbrace{(y)^2}_{v}$$

$$3y^2\cdot\frac{dy}{dx} + 3y^2 + 3x\cdot 2y\cdot\frac{dy}{dx} - 3x^2 = 0$$

$$3y^2\frac{dy}{dx} + 6xy\cdot\frac{dy}{dx} + 3y^2 - 3x^2 = 0$$

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

$$\frac{dy}{dx} = \frac{3x^2 - 3y^2}{3y^2 + 6xy} = 0$$

Max/Min

$$3x^2 - 3y^2 = 0$$

$$3x^2 = 3y^2$$

$$\sqrt{x^2} = \sqrt{y^2}$$

$$x = \pm y$$