Lecture 20

Tuesday, November 8, 2022 8:03 AM

* Questions....

* Implicit differentiation:

$$xy + \sin y = 0$$

$y = y(x)$

$$\frac{d}{dx}(\cdots) = \frac{d}{dx}(0)$$

$$xy' + y + y'\cos y = 0$$

$$\rightsquigarrow \quad y'(x + \cos y) = -y$$

$$\rightsquigarrow \quad \boxed{y' = \frac{-y}{x + \cos y}}$$

This curves passes through the point

$$(x, y) = (0, \pi)$$

Slope is $y' = \dfrac{-\pi}{0 + \cos\pi} = \dfrac{-\pi}{-1} = \pi$

On Maple:

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implicitdiff( x*y + sin(y) = 0, y, x)
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Plot the curve $x + y + \sin(y) = 0$:

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with(plots):
implicitplot( x+y+sin(y)=0, x=-1..1, y=0..2*Pi);
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Differentials

$$y = f(x)$$

$$\frac{\Delta y}{\Delta x} \approx f'(x) \rightsquigarrow \Delta y \approx f'(x)\,\Delta x$$

Δy: change in y; Δx: change in x