derivative

Examples Random

Assuming "derivative" refers to a computation | Use as a general topic or referring to a mathematical definition or a word instead

function to differentiate: e^cos x

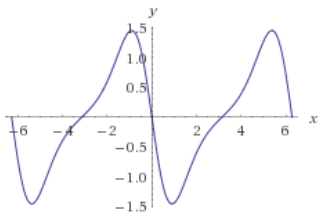
Also include: differentiation variable

Derivative:

Approximate form | Step-by-step solution

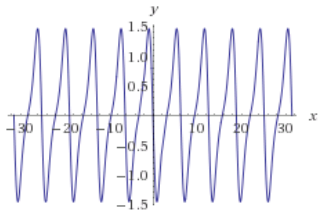
$$\frac{d}{dx}\left(e^{\cos(x)}\right) = \sin(x)\left(-e^{\cos(x)}\right)$$

Plots:



(x from -6.3 to 6.3)

Enable interactivity



(x from -31.4 to 31.4)

Enable interactivity

Alternate form:

$$-\frac{1}{2}\, i\, e^{\frac{1}{2}\left(e^{-i\,x}+e^{i\,x}\right)}\left(e^{-i\,x}-e^{i\,x}\right)$$

Root:

Approximate form | Step-by-step solution

$$x = \pi\, n, \quad n \in \mathbb{Z}$$

$\mathbb{Z}$ is the set of integers

Properties as a real function:

Approximate forms

Domain:

$\mathbb{R}$ (all real numbers)

Range:

$$\left\{y \in \mathbb{R} : -\sqrt{\frac{1}{2}\left(\sqrt{5}-1\right)}\, e^{\frac{1}{2}\left(\sqrt{5}-1\right)} \le y \le \sqrt{\frac{1}{2}\left(\sqrt{5}-1\right)}\, e^{\frac{1}{2}\left(\sqrt{5}-1\right)}\right\}$$

Periodicity:

periodic in x with period $2\,\pi$

Parity:

odd

$\mathbb{R}$ is the set of real numbers

Series expansion at x=0:

$$-e\,x+\frac{2\,e\,x^3}{3}-\frac{31\,e\,x^5}{120}+O\left(x^6\right)$$

(Taylor series)

Big-O notation »

Indefinite integral:

Approximate form | Step-by-step solution

$$\int -e^{\cos(x)}\sin(x)\,dx = e^{\cos(x)} + \text{constant}$$

Local maxima:

Approximate form

$$\max\left\{\sin(x)\left(-e^{\cos(x)}\right)\right\} = \sin\left(2\tan^{-1}\left(\sqrt{\sqrt{5}-2}\right)\right)e^{\cos\left(2\tan^{-1}\left(\sqrt{\sqrt{5}-2}\right)\right)}$$

at $x = 2n\pi - 2\tan^{-1}\left(\sqrt{-2+\sqrt{5}}\right)$ for integer n

$\tan^{-1}(x)$ is the inverse tangent function

Local minima:

Approximate form

$$\min\left\{\sin(x)\left(-e^{\cos(x)}\right)\right\} = \sin\left(2\tan^{-1}\left(\sqrt{\sqrt{5}-2}\right)\right)\left(-e^{\cos\left(2\tan^{-1}\left(\sqrt{\sqrt{5}-2}\right)\right)}\right)$$

at $x = 2n\pi + 2\tan^{-1}\left(\sqrt{-2+\sqrt{5}}\right)$ for integer n

Differential geometric curves:

(requires interactivity)

Enable Interactivity

POWERED BY THE **WOLFRAM LANGUAGE**

Standard computation time exceeded... Try again with additional computation time »

Related Queries:

- = series (f(x+eps)/f(x))^(1/eps) at eps = 0
- = continued fraction e^(cos(x))
- = d/dx(e^(cos(x)))^(e^(cos(x)))
- = limit of e^(cos(x)) as x -> -infinity