



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: (cos x)/x4

Also include: differentiation variable

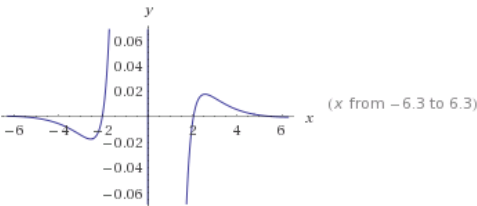
Derivative:

Step-by-step solution

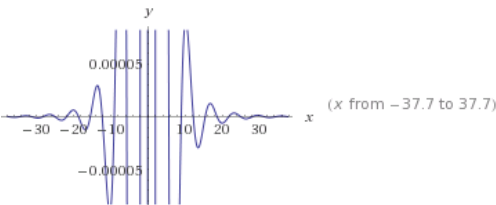
$$\frac{d}{dx}\left(\frac{\cos(x)}{x^4}\right) = -\frac{x \sin(x) + 4 \cos(x)}{x^5}$$

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PLOTS:



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Alternate forms:

$$\begin{aligned} &-\frac{x \sin(x) + 4 \cos(x)}{x^5} \\ &-\frac{4 \cos(x)}{x^5} - \frac{\sin(x)}{x^4} \\ &-\frac{2 e^{-i x}}{x^5} - \frac{2 e^{i x}}{x^5} - \frac{i e^{-i x}}{2 x^4} + \frac{i e^{i x}}{2 x^4} \end{aligned}$$

Numerical roots:

More digits

$$\begin{aligned} x &\approx \pm 12.2507735848400\dots \\ x &\approx \pm 9.00683532145946\dots \\ x &\approx \pm 5.66869058554425\dots \\ x &\approx \pm 2.04300861248240\dots \end{aligned}$$

Properties as a real function:

Domain:

$$\{x \in \mathbb{R} : x \neq 0\}$$

Parity:

odd

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

Series expansion at x=0:

$$-\frac{4}{x^5} + \frac{1}{x^3} - \frac{x}{360} + O(x^2)$$
  
(Laurent series)

[Big-O notation »](#)

Indefinite integral:

[Step-by-step solution](#)

$$\int -\frac{4 \cos(x) + x \sin(x)}{x^5} dx = \frac{\cos(x)}{x^4} + \text{constant}$$

Differential geometric curves:

(requires interactivity)

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Standard computation time exceeded...

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|---|--|
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| <a href="#">= osculating circle of (cos(x))/x^4</a> | <a href="#">= series of (cos(x))/x^4 at x = 0</a>                |

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