WolframAlpha computational intelligence™

`d( ln( ( 1/(σ*sqrt(2π) ))(   (e^(-(x1-µ)^2/(2σ^2)) )   )   )   )/ dσ`   ⊗ ▤

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Derivative: [Decimal form]   ☑ Step-by-step solution

$$\frac{\partial}{\partial\sigma}\left(\log\left(\frac{e^{-(x1-\mu)^2/(2\sigma^2)}}{\sigma\sqrt{2\pi}}\right)\right) = \frac{\mu^2 - \sigma^2 + x1^2 - 2\mu\,x1}{\sigma^3}$$

$\log(x)$ is the natural logarithm

Solutions: ☑ Step-by-step solution

$$x1 = \frac{1}{2}\sigma^3\left(\frac{2\mu}{\sigma^3} \pm \sqrt{\frac{4\mu^2}{\sigma^6} - \frac{4\left(\frac{\mu^2}{\sigma^3} - \frac{1}{\sigma}\right)}{\sigma^3}}\right) \quad \left(\frac{1}{\sigma} \neq 0\right)$$

Alternate forms: [More]

$$-\frac{(-\mu + \sigma + x1)(\mu + \sigma - x1)}{\sigma^3}$$

$$\frac{(x1 - \mu)^2 - \sigma^2}{\sigma^3}$$

$$\frac{\mu^2 - \sigma^2 + x1(x1 - 2\mu)}{\sigma^3}$$

Expanded form:

$$\frac{\mu^2}{\sigma^3} - \frac{1}{\sigma} + \frac{x1^2}{\sigma^3} - \frac{2\mu\,x1}{\sigma^3}$$

Property as a function:

Parity

odd

Indefinite integral:

$$\int \frac{x1^2 - 2\,x1\,\mu + \mu^2 - \sigma^2}{\sigma^3}\,dx1 = \frac{\frac{x1^3}{3} - \mu\,x1^2 + \mu^2\,x1 - \sigma^2\,x1}{\sigma^3} + \text{constant}$$

Limit:

$$\lim_{\sigma \to \pm\infty} \frac{x1^2 - 2\,x1\,\mu + \mu^2 - \sigma^2}{\sigma^3} = 0$$

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Related Queries:

= integrate log(e^(-(x1 ...   = series of log(e^(-(x1 ...

= d^3/dsigma^3 (log(e^...   = series (f(x+eps)/f(x))...

= Felix Hausdorff

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