Differentiator

Raptor-X102

Annotation

This is auto-generated by Differentiator document. Don't try to change TeX file. Change TeX introduction function instead. In this article we will take derivative of functions, do Taylor's extension.
GitHub: https://github.com/Raptor-X102

Differentiating

Now let's take derivative of this expression:

$$\ln\left(1+\sin\arctan\tanh x\right)$$

Differentiating ln: $(\ln f(x))' = \frac{f'(x)}{f(x)}$

$$\ln\left(1+\sin\arctan\tanh x\right)$$

Differentiating sum: $(f(x)+g(x))' = f'(x)+g'(x)$

$$1+\sin\arctan\tanh x$$

Differentiating sin: $(\sin f(x))' = \cos f(x) f'(x)$

$$\sin\arctan\tanh x$$

Differentiating arctan: $(\arctan f(x))' = \frac{f'(x)}{1+(f(x))^2}$

$$\arctan\tanh x$$

Differentiating tanh: $(\tanh f(x))' = \frac{f'(x)}{\cosh^2 x}$

$$\tanh x$$

Result:

$$\frac{1}{1+\alpha}\cos\arctan\tanh x\frac{\beta}{\gamma}$$

$\gamma = 1+(\tanh x)^2$, $\beta = \frac{1}{(\cosh x)^2}$, $\alpha = \sin\arctan\tanh x$

Taylor extension:

$$f(0.3) = 0 + 1(0.3-0) + \frac{-1}{2}(0.3-0)^2 + \frac{-3}{6}(0.3-0)^3 + \frac{14}{24}(0.3-0)^4 \approx 0.246225$$