

## ‘Box Method’ for Derivatives

The following indicates the derivative of various common functions by filling in a box—ignoring the chain rule. For example, to find  $\frac{d}{dx} \tan(x^3)$ , we fill in the box for  $\frac{d}{dx} \tan(\square) = \sec^2(\square)$  with  $x^3$  and remember to apply the chain rule—which says to multiply by the derivative the contents of  $\square$ . Therefore,  $\frac{d}{dx} \tan(\square) = \sec^2(\square) \cdot \frac{d}{dx} x^3 = \sec^2(\square) \cdot 3x^2 = 3x^2 \sec^2(x^3)$ .

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• <math>\frac{d}{dx} (\text{constant}) = 0</math></li> <li>• <math>\frac{d}{dx} \square^n = n \square^{n-1}</math></li> <li>• <math>\frac{d}{dx} \#^\square = \#^\square \ln \#</math></li> <li>• <math>\frac{d}{dx} e^\square = e^\square</math></li> <li>• <math>\frac{d}{dx} \log_b(\square) = \frac{1}{(\square) \ln b}</math></li> <li>• <math>\frac{d}{dx} \ln(\square) = \frac{1}{\square}</math></li> <li>• <math>\frac{d}{dx} \sin(\square) = \cos(\square)</math></li> <li>• <math>\frac{d}{dx} \cos(\square) = -\sin(\square)</math></li> <li>• <math>\frac{d}{dx} \tan(\square) = \sec^2(\square)</math></li> </ul> | <ul style="list-style-type: none"> <li>• <math>\frac{d}{dx} \csc(\square) = -\csc(\square) \cot(\square)</math></li> <li>• <math>\frac{d}{dx} \sec(\square) = \sec(\square) \tan(\square)</math></li> <li>• <math>\frac{d}{dx} \arcsin(\square) = \frac{1}{\sqrt{1-(\square)^2}}</math></li> <li>• <math>\frac{d}{dx} \arccos(\square) = \frac{-1}{\sqrt{1-(\square)^2}}</math></li> <li>• <math>\frac{d}{dx} \arctan(\square) = \frac{1}{1+(\square)^2}</math></li> <li>• <math>\frac{d}{dx} \operatorname{arccsc}(\square) = \frac{-1}{ \square  \sqrt{(\square)^2 - 1}}</math></li> <li>• <math>\frac{d}{dx} \operatorname{arcsec}(\square) = \frac{1}{ \square  \sqrt{(\square)^2 - 1}}</math></li> <li>• <math>\frac{d}{dx} \operatorname{arccot}(\square) = \frac{-1}{1+(\square)^2}</math></li> </ul> |
|--|--|

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• <math>\frac{d}{dx} \sinh(\square) = \cosh(\square)</math></li> <li>• <math>\frac{d}{dx} \cosh(\square) = \sinh(\square)</math></li> <li>• <math>\frac{d}{dx} \tanh(\square) = \operatorname{sech}^2(\square)</math></li> <li>• <math>\frac{d}{dx} \operatorname{csch}(\square) = -\operatorname{csch}(\square) \coth(\square)</math></li> <li>• <math>\frac{d}{dx} \operatorname{sech}(\square) = -\operatorname{sech}(\square) \tanh(\square)</math></li> <li>• <math>\frac{d}{dx} \coth(\square) = -\operatorname{csch}^2(\square)</math></li> <li>• <math>\frac{d}{dx} \sinh^{-1}(\square) = \frac{1}{\sqrt{(\square)^2 + 1}}</math></li> </ul> | <ul style="list-style-type: none"> <li>• <math>\frac{d}{dx} \cosh^{-1}(\square) = \frac{1}{\sqrt{(\square)^2 - 1}}</math></li> <li>• <math>\frac{d}{dx} \tanh^{-1}(\square) = \frac{1}{1-(\square)^2}</math></li> <li>• <math>\frac{d}{dx} \operatorname{csch}^{-1}(\square) = \frac{-1}{ \square  \sqrt{1+(\square)^2}}</math></li> <li>• <math>\frac{d}{dx} \operatorname{sech}^{-1}(\square) = \frac{-1}{(\square) \sqrt{1-(\square)^2}}</math></li> <li>• <math>\frac{d}{dx} \coth^{-1}(\square) = \frac{1}{1-(\square)^2}</math></li> </ul> |
|---|--|