

# ◇ FORMULAS ◇

## Trig Functions

1.  $\frac{d}{du} \sin u = \cos u$
2.  $\frac{d}{du} \cos u = -\sin u$
3.  $\frac{d}{du} \tan u = \sec^2 u$
4.  $\frac{d}{du} \cot u = -\csc^2 u$
5.  $\frac{d}{du} \sec u = \sec u \tan u$
6.  $\frac{d}{du} \csc u = -\csc u \cot u$



## Log and Exponential Functions

7.  $\frac{d}{du} \ln |u| = \frac{1}{u}$
8.  $\frac{d}{du} \log_a |u| = \frac{1}{u \ln a}$
9.  $\frac{d}{du} e^u = e^u$
10.  $\frac{d}{du} a^u = a^u \ln a$



## Inverse Trig Functions

12.  $\frac{d}{du} \sin^{-1} u = \frac{1}{\sqrt{1-u^2}}$
13.  $\frac{d}{du} \cos^{-1} u = -\frac{1}{\sqrt{1-u^2}}$
14.  $\frac{d}{du} \tan^{-1} u = \frac{1}{1+u^2}$
15.  $\frac{d}{du} \cot^{-1} u = -\frac{1}{1+u^2}$
16.  $\frac{d}{du} \sec^{-1} u = \frac{1}{u\sqrt{u^2-1}}$
17.  $\frac{d}{du} \csc^{-1} u = -\frac{1}{u\sqrt{u^2-1}}$



## Hyperbolic Trig Functions

18.  $\frac{d}{du} \sinh u = \cosh u$
19.  $\frac{d}{du} \cosh u = \sinh u$
20.  $\frac{d}{du} \tanh u = \text{sech}^2 u$
21.  $\frac{d}{du} \coth u = -\text{csch}^2 u$
22.  $\frac{d}{du} \text{sech} u = -\text{sech} u \tanh u$
23.  $\frac{d}{du} \text{csch} u = -\text{csch} u \coth u$



## Linear Approximations and Differentials

24. The Linear Approximation to  $f(x)$  at  $a$  is  $L(x) = f(a) + f'(a)(x - a)$
25. The Differential of  $y = f(x)$  in  $y$  is  $dy = \left(\frac{dy}{dx}\right) dx$