

## Handout 2: Basic differentiation

$f(x)$	$\frac{df}{dx}$
$x^n$	$nx^{n-1}$
1	0
$\ln(x)$	$x^{-1}$
$e^x$	$e^x$
$\sin(x)$	$\cos(x)$
$\cos(x)$	$-\sin(x)$
$\sinh(x)$	$\cosh(x)$
$\cosh(x)$	$\sinh(x)$

*Table 1: Table of Basic Derivatives*

Rule	$f(x)$	$\frac{df}{dx}$	Notes
1	$u + v$	$\frac{du}{dx} + \frac{dv}{dx}$	Addition Rule
2	$Cu$	$C \frac{du}{dx}$	( $C = \text{constant}$ )
3	$uv$	$v \frac{du}{dx} + u \frac{dv}{dx}$	Product Rule
4	$\frac{u}{v}$	$\frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$	Quotient Rule
5	$f(u(x))$	$\frac{df}{du} \frac{du}{dx}$	Chain Rule
6	$\frac{dx}{dy}$	$\frac{1}{\frac{dy}{dx}}$	For Inverse Functions

*Table 2: Table of Rules for Differentiation*