ECON 6020 - Microeconomics 1

Spring 2016

Mathematics Rules and Formulae

Table 1: Rules for Derivatives

Function	Rule
Constant function	$\frac{d\alpha}{dx} = 0$, where α is any constant
Scalar multiple	$\frac{d\alpha f(x)}{dx} = \alpha \frac{df(x)}{dx} = \alpha f'(x)$ where α is any constant
Sum	$\frac{d(f(x)+g(x))}{dx} = f'(x) + g'(x)$
Difference	$\frac{d(f(x)-g(x))}{dx} = f'(x) - g'(x)$
Power rule	$\frac{dx^\alpha}{dx} = \alpha x^{\alpha-1}$, where α is any constant
Product rule	$\frac{df(x)g(x)}{dx} = f'(x)g(x) + f(x)g'(x)$
Quotient rule	$\frac{d\left(\frac{f(x)}{g(x)}\right)}{dx} = \frac{f'(x)g(x)-f(x)g'(x)}{g(x)^2}$
Chain rule	$\frac{d(f(g(x))}{dx} = f'(g(x))g'(x)$
Log function	$\frac{dln(f(x))}{dx} = \frac{1}{f(x)} f'(x)$
Exponential function	$\frac{de^{f(x)}}{dx} = e^{f(x)} f'(x)$

Table 2: Rules of Natural Logarithms

Log of the mathematical constant	$ln(e) = 1$
Log of a product	$ln(xy) = ln(x) + ln(y)$
Log of a quotient	$ln(\frac{x}{y}) = ln(x) - ln(y)$
Log of an exponential function	$ln(x^y) = yln(x)$
Log of a non-positive number	$ln(x)$ is not defined for $x \leq 0$

Table 3: Rules of Exponents

1.	$x^{-n} = \frac{1}{x^n}$
2.	$x^n x^m = x^{n+m}$
3.	$(x^n)^m = x^{nm}$
4.	$\frac{x^n}{x^m} = x^{n-m}$