CALCULATIONS OF DERIVATIVES

In economics we often use mathematical equations to quantify or specify the relationship between the variables. These equations are often referred to as specific functions. In these equations, it is common to denote a dependent variable as y, independent variables as x_1, x_2, etc., and constants as a_1 (or a), a_2 (or b), etc. Mathematical rules enable us to determine the partial derivative for different functions. Note, if y is a function of only one variable x, the partial derivative and the total derivative (i.e. dy/dx) are the same. A few common examples follow:

FUNCTION (y)	DERIVATIVE (y′)
1. Power function	Power rule
=> $y = ax^n$	$\frac{dy}{dx} = nax^{n-1}$
Special case	
$n = 0 \Rightarrow y = a$	=> $\frac{dy}{dx} = oax^{0-1} = 0$
2. Sum of functions	Sum of derivatives rule
=> $y = u + w$	=> $\frac{dy}{dx} = \frac{dU}{dx} + \frac{dW}{dX}$
where $U = g(x)$ $W = h(x)$	
3. Product of functions	Product rule
=> $y = UW$	=> $\frac{dy}{dx} = U\frac{dW}{dx} + W\frac{du}{dx}$
where $U = g(x)$ $W = h(x)$	
4. Chain function	Chain rule
=> $y = f(z)$	=> $\frac{dy}{dx} = \frac{dy}{dz} \bullet \frac{dz}{dx}$
where $Z = g(x)$	