- Partial derivatives
  - Notation
  - Chain rule

Partial derivatives

To solve partial derivatives, hold the other variables (The ones other variables than the one you are deriving from) constant, then solve the derivative as a total one;

Ex.:

$$\frac{\partial}{\partial x} 2x^2 + xy + z$$

Factoring out the highest power from each monomial

$$\frac{\partial}{\partial x} 2x^2 + xy + z =$$

$$4x + y$$

Notation

$$\frac{\partial f}{\partial x} = f_x$$

$$\frac{\partial^2 f}{\partial x^2} = \frac{\partial}{\partial x}\frac{\partial f}{\partial x} = f_{xx}$$

$$\frac{\partial^2 f}{\partial xy} = \frac{\partial}{\partial x}\frac{\partial f}{\partial y} = f_{xy}$$

Chain rule

To solve partial derivatives where the variable you are deriving from is dependent on other variables ($x(t)$), one can use the chain rule;

$$\frac{dz}{dt} = \frac{\partial z}{\partial x} \cdot \frac{dx}{dt} + \frac{\partial z}{\partial y} \cdot \frac{dy}{dt}; y = f(t) \quad \& \quad x = g(t)$$