

Polynomial Regression Analysis :

$$\hat{\mathbf{a}} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T \vec{\mathbf{y}}$$

Simple Regression :

$$y = \alpha + \beta x,$$

$$\hat{\beta} = \frac{\bar{xy} - \bar{x} \bar{y}}{\bar{x}^2 - \bar{x}^2}$$

$$\hat{\alpha} = \bar{y} - \beta \bar{x}.$$

If a y-intercept of zero is assumed :

$$\hat{\beta} = (\bar{xy}) / (\bar{x}^2).$$

*Note: $\bar{x}^2 - \bar{x}^2$ is also known as the variance of (x),
since another way of computing the standard deviation of (x) is*

$$\sqrt{\bar{x}^2 - \bar{x}^2}$$