Công thức sử dụng trong "Hồi quy tuyến tính đơn"

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \tag{1}$$

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i \tag{2}$$

$$S_{xx} = \sum_{i=1}^{n} x_i^2 - \frac{\left(\sum\limits_{i=1}^{n} x_i\right)^2}{n} \tag{3}$$

$$S_{yy} = \sum_{i=1}^{n} y_i^2 - \frac{\left(\sum\limits_{i=1}^{n} y_i\right)^2}{n} \tag{4}$$

$$S_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = \sum_{i=1}^{n} x_i y_i - \frac{\left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)}{n} \tag{5}$$

$$\text{Hệ số tương quan mẫu:} r_{xy} = \frac{S_{xx}}{\sqrt{S_{xx} \times S_{yy}}} \tag{6}$$

$$\hat{\beta}_1 = \frac{\sum_{i=1}^{n} x_i y_i - \frac{\left(\sum\limits_{i=1}^{n} x_i\right)\left(\sum\limits_{i=1}^{n} y_i\right)}{n}}{\sum\limits_{i=1}^{n} x_i^2 - \frac{\left(\sum\limits_{i=1}^{n} x_i\right)^2}{n}} = \frac{S_{xy}}{S_{xx}} \tag{7}$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x} \tag{8}$$

$$SSR = \sum_{i=1}^{n} (\hat{y}_i - \bar{y})^2 \tag{9}$$

$$SSE \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 \tag{10}$$

$$SST = \sum_{i=1}^{n} (y_i - \bar{y})^2 = \sum_{i=1}^{n} y_i^2 - \frac{\left(\sum_{i=1}^{n} y_i\right)^2}{n} \tag{11}$$

$$SST = SSR + SSE \tag{12}$$

$$SSE = SST - \hat{\beta}_1 S_{xy} \tag{13}$$

$$\hat{\sigma}^2 = MSE = \frac{SSE}{n-2} = \frac{1}{n-2} \sum_{i=1}^{n} \left[y_i - (\hat{\beta}_0 + \hat{\beta}_1 x_i) \right]^2 \tag{14}$$

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} \tag{15}$$

$$\tag{16}$$

- Khoảng tin cậy $100(1-\alpha)\%$ cho β_1:

$$\hat{\beta}_1 - t_{1-\alpha/2}^{n-2} \sqrt{\frac{MSE}{S_{xx}}} \leq \beta_1 \leq \hat{\beta}_1 + t_{1-\alpha/2}^{n-2} \sqrt{\frac{MSE}{S_{xx}}} \tag{17}$$

- Khoảng tin cậy $100(1-\alpha)\%$ cho β_0:

$$\hat{\beta}_0 - t_{1-\alpha/2}^{n-2} \sqrt{MSE \left(\frac{1}{n} + \frac{\bar{x}^2}{S_{xx}} \right)} \leq \beta_0 \leq \hat{\beta}_0 + t_{1-\alpha/2}^{n-2} \sqrt{MSE \left(\frac{1}{n} + \frac{\bar{x}^2}{S_{xx}} \right)} \tag{18}$$

với

- n = số cặp giá trị quan trắc (x_i, y_i);
- $t_{1-\alpha/2}^{n-2}$ là phân vị mức $1-\alpha/2$ của biến ngẫu nhiên $t(n-2)$.