Kvantilisek, módusz:

$$s_{i/k} = \frac{i}{k}(N+1), \quad Y_{\frac{i}{k}} = Y^*_{[s_{i/k}]} + \{s_{i/k}\}\left(Y^*_{[s_{i/k}]+1} - Y^*_{[s_{i/k}]}\right),$$

$$Y_{\frac{i}{k}} = Y_{j,0} + \frac{\frac{i}{k}N - f'_{j-1}}{f_j}h_j, \quad f'_{j-1} < \frac{i}{k}N \le f'_{j-1},$$

$$Mo = Y_{mo,0} + \frac{d_a}{d_a + d_f}h_{mo}, \quad d_a = f_{mo} - f_{mo-1}, \quad d_f = f_{mo} - f_{mo+1}.$$

Ferdeség, lapultság, momentumok:

$$\alpha_3 = \frac{M_3(\overline{Y})}{\sigma^3}, \quad F_p = \frac{(Y_{1-p} - Me) - (Me - Y_p)}{(Y_{1-p} - Me) + (Me - Y_p)},$$

$$\alpha_4 = \frac{M_4(\overline{Y})}{\sigma^4} - 3, \quad M_r(A) = \frac{\sum_{i=1}^N (Y_i - A)^r}{N} \text{ ill. } M_r(A) = \frac{\sum_{i=1}^k f_i(Y_i - A)^r}{N}.$$

Asszociáció:

$$f^*_{i,j} = \frac{f_{i,\bullet} f_{\bullet,j}}{N}, \quad \chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(f_{i,j} - f^*_{i,j})^2}{f^*_{i,j}}, \quad C^2 = \frac{\chi^2}{N \min(r-1, c-1)}.$$

Vegyes kapcsolat:

$$\sigma_K^2 = \frac{\sum_{j=1}^M N_j(\overline{X}_j - \overline{X})^2}{N} = \frac{\sum_{j=1}^M N_j K_j^2}{N}, \quad \sigma_B^2 = \frac{\sum_{j=1}^M \sum_{i=1}^{N_j} (X_{i,j} - \overline{X}_j)^2}{N} = \frac{\sum_{j=1}^M N_j \sigma_j^2}{N},$$

$$\sigma^2 = \frac{\sum_{j=1}^M \sum_{i=1}^{N_j} (X_{i,j} - \overline{X})^2}{N}, \quad H^2 = \frac{\sigma_K^2}{\sigma^2} = \frac{SS_K}{SS_T}.$$

Korreláció:

$$r_{X,Y} = \frac{\sum_{i=1}^N (X_i - \overline{X})(Y_i - \overline{Y})}{\sqrt{\sum_{i=1}^N (X_i - \overline{X})^2 \sum_{i=1}^N (Y_i - \overline{Y})^2}} = \frac{\sum_{i=1}^N d_{X_i} d_{Y_i}}{\sqrt{\sum_{i=1}^N d_{X_i}^2 \sum_{i=1}^N d_{Y_i}^2}} = \frac{\overline{XY} - \overline{X}\cdot\overline{Y}}{\sigma_X \, \sigma_Y}.$$

Rangkorreláció:

$$\rho = 1 - \frac{6\sum_{i=1}^N (R_{X_i} - R_{Y_i})^2}{N(N^2-1)}.$$

Standardizálás:

$$K = \overline{V}_1 - \overline{V}_0 = \frac{\sum A_1}{\sum B_1} - \frac{\sum A_0}{\sum B_0} = \frac{\sum B_1 V_1}{\sum B_1} - \frac{\sum B_0 V_0}{\sum B_0},$$

$$K'_s = \frac{\sum B_s V_1}{\sum B_s} - \frac{\sum B_s V_0}{\sum B_s}, \quad K''_s = \frac{\sum B_1 V_s}{\sum B_1} - \frac{\sum B_0 V_s}{\sum B_0}.$$

Indexszámítás:

$$I_v = \frac{\sum p_1 q_1}{\sum p_0 q_0}, \quad I_p^s = \frac{\sum p_1 q_s}{\sum p_0 q_s}, \quad I_q^s = \frac{\sum p_s q_1}{\sum p_s q_0}.$$

Intervallumbecslések

- várható értékre:

$$\overline{y} \pm z_{1-\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}, \quad \overline{y} \pm t_{1-\frac{\alpha}{2}} \frac{s_y}{\sqrt{n}} \quad (df = n-1), \quad \overline{y} \pm k \frac{\sigma}{\sqrt{n}} \quad \left(\alpha = \frac{1}{k^2}\right),$$

- szórásnégyzetre:

$$c_a = \frac{(n-1)s_y^2}{\chi^2_{1-\frac{\alpha}{2}}}, \quad c_f = \frac{(n-1)s_y^2}{\chi^2_{\frac{\alpha}{2}}} \quad (df = n-1),$$

- sokasági arányra:

$$p \pm z_{1-\frac{\alpha}{2}} \sqrt{\frac{p(1-p)}{n}},$$

- várható értékek különbségére:

$$\overline{d} \pm z_{1-\frac{\alpha}{2}} \sqrt{\frac{\sigma_y^2}{n_x} + \frac{\sigma_x^2}{n_y}},$$

$$\overline{d} \pm t_{1-\frac{\alpha}{2}}\, s_c \sqrt{\frac{1}{n_x} + \frac{1}{n_y}}, \quad s_c^2 = \frac{(n_x-1)s_x^2 + (n_y-1)s_y^2}{n_x + n_y - 2} \quad (df = n_x + n_y - 2).$$

Próbastatisztikák hipotézisvizsgálatokhoz

- Z próbák:

$$Z = \frac{\overline{y} - \mu_0}{\frac{\sigma}{\sqrt{n}}}, \qquad Z = \frac{\overline{d} - \delta_0}{\sqrt{\frac{\sigma_y^2}{n_x} + \frac{\sigma_x^2}{n_y}}},$$

- t próbák:

$$t = \frac{\overline{y} - \mu_0}{\frac{s_y}{\sqrt{n}}}, \qquad t = \frac{\overline{d} - \delta_0}{s_c \sqrt{\frac{1}{n_x} + \frac{1}{n_y}}}, \qquad t = \frac{\overline{d} - \mu_0}{\frac{s_d}{\sqrt{n}}},$$

- szórásra vonatkozó próbák:

$$\chi^2 = \frac{(n-1)s_Y^2}{\sigma_0^2}, \qquad F = \frac{s_Y^2}{s_X^2},$$

- χ^2 próbák (illeszkedés, függetlenség, homogenitás):

$$\chi^2 = \sum_{i=1}^{k} \frac{(f_i - nP_i)^2}{nP_i}, \qquad \chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(f_{i,j} - f_{i,j}^*)^2}{f_{i,j}^*}, \qquad \chi^2 = n_X n_Y \sum_{i=1}^{k} \frac{1}{n_{Y_i} + n_{X_i}} \left(\frac{n_{Y_i}}{n_Y} - \frac{n_{X_i}}{n_X}\right)^2,$$

- binomiális próba:

$$Z = \frac{k - nP_0 \pm \frac{1}{2}}{\sqrt{nP_0\,(1-P_0)}} = \frac{p - P_0 \pm \frac{1}{2n}}{\sqrt{\frac{P_0(1-P_0)}{n}}},$$

- sorozatpróbák:

$$Z = \frac{r - \mu_r}{\sigma_r}, \qquad \mu_r = \frac{2n_X n_Y}{n_X + n_Y} + 1, \qquad \sigma_r^2 = \frac{2n_X n_Y (2n_X n_Y - n_X - n_Y)}{(n_X + n_Y)^2 (n_X + n_Y - 1)},$$

- rangösszegpróba:

$$U_Y = n_X n_Y + \frac{n_Y(n_Y+1)}{2} - R_Y, \qquad \mu_{U_Y} = \frac{n_X n_Y}{2}, \qquad \sigma_{U_Y}^2 = \frac{n_X n_Y (n_X + n_Y + 1)}{12}.$$

Lineáris trend- és regressziószámítás

$$\text{I.}\quad \sum_{i=1}^{n} y_i = n\beta_0 + \beta_1 \sum_{i=1}^{n} x_i, \qquad \text{II.}\quad \sum_{i=1}^{n} y_i x_i = \beta_0 \sum_{i=1}^{n} x_i + \beta_1 \sum_{i=1}^{n} x_i^2,$$

$$\widehat{\beta}_1 = \frac{\sum_{i=1}^{n} d_{x_i} d_{y_i}}{\sum_{i=1}^{n} d_{x_i}^2}, \qquad \widehat{\beta}_0 = \overline{y} - \widehat{\beta}_1 \overline{x},$$

szezonalitás

$$s_j = \frac{\sum_{i=1}^{n/p} y_{ij} - \widehat{y}_{ij}}{n/p}, \qquad \overline{s} = \frac{\sum_{j=1}^{p} s_j}{p}, \qquad \tilde{s}_j = s_j - \overline{s},$$

$$s_j^* = \frac{\sum_{i=1}^{n/p} y_{ij} / \widehat{y}_{ij}}{n/p}, \qquad \overline{s}^* = \frac{\sum_{j=1}^{p} s_j^*}{p}, \qquad \tilde{s}_j^* = \frac{s_j^*}{\overline{s}^*}.$$