Def.: um ponto $\bar{x} \in [a,b]$ é uma raiz de multiplicidade m da equação $f(x)=0$ se $f(x)=(x-\bar{x})^m mg(x)$ com $g(\bar{x}) \neq 0$ em $[a,b]$.

$$\text{Erro relativo:} \quad \frac{|x_{k+1}-x_k|}{|x_{k+1}|} < \varepsilon. \qquad \lim_{k\to\infty} \frac{|e_{k+1}|}{|e_k|^p} = c. \qquad f(x) = \sum_{k=0}^{\infty} \frac{(x-\bar{x})^k f^{(k)}(\bar{x})}{k!}$$

$$x_{k+1} = \frac{x_{k-1}f(x_k) - x_k f(x_{k-1})}{f(x_k)-f(x_{k-1})}.$$

$$\text{TVM:} \quad f(b)-f(a) = f'(\xi)(b-a). \qquad |\varphi'(x)| = M < 1, \ \forall x \in I.$$

$$|F_x|+|F_y| = k_1 < 1; \quad |G_x|+|G_y| = k_2 < 1.$$

$$J\,(x_k - x_{k-1}) = -f(x_{k-1}).$$

$$P(x) = (x^2-\alpha x-\beta)Q(x) + b_1(x-\alpha)+b_0. \quad Q(x) = b_n x^{n-2}+\ldots+b_2.$$

$$b_n = a_n,\ b_{n-1} = a_{n-1}+\alpha b_n,\ b_{n-2} = a_{n-2}+\alpha b_{n-1}+\beta b_n,\ \ldots b_1 = a_1+\alpha b_2+\beta b_3,\ b_0 = a_0+\alpha b_1+\beta b_2.$$

$$\frac{\partial b_n}{\partial\alpha} = 0,\ \frac{\partial b_{n-1}}{\partial\alpha} = b_n,\ \frac{\partial b_{n-2}}{\partial\alpha} = b_{n-1}+\alpha\frac{\partial b_{n-1}}{\partial\alpha},\ \frac{\partial b_{n-3}}{\partial\alpha} = b_{n-2}+\alpha\frac{\partial b_{n-2}}{\partial\alpha}+\beta\frac{\partial b_{n-1}}{\partial\alpha},\ \ldots, \tag{1}$$

$$\frac{\partial b_2}{\partial\alpha} = b_3+\alpha\frac{\partial b_3}{\partial\alpha}+\beta\frac{\partial b_4}{\partial\alpha}(=\partial b_1/\partial\beta),\ \frac{\partial b_1}{\partial\alpha} = b_2+\alpha\frac{\partial b_2}{\partial\alpha}+\beta\frac{\partial b_3}{\partial\alpha}(=\partial b_0/\partial\beta),\ \frac{\partial b_0}{\partial\alpha} = b_1+\alpha\frac{\partial b_1}{\partial\alpha}+\beta\frac{\partial b_2}{\partial\alpha}, \tag{2}$$

$$\begin{cases} \frac{\partial b_1}{\partial\alpha}\delta\alpha_{k-1} + \frac{\partial b_1}{\partial\beta}\delta\beta_{k-1} = -b_1(\alpha_{k-1},\beta_{k-1}) \\ \frac{\partial b_0}{\partial\alpha}\delta\alpha_{k-1} + \frac{\partial b_0}{\partial\beta}\delta\beta_{k-1} = -b_0(\alpha_{k-1},\beta_{k-1}) \end{cases}$$

$$det(A) = u_{11}u_{22}\cdots u_{nn}, \qquad \frac{\|\delta x\|}{\|x\|} \le \text{cond}(A)\frac{\|\delta b\|}{\|b\|}$$

$$\begin{cases} u_{ij} = a_{ij} - \sum_{k=1}^{i-1} \ell_{ik}u_{kj}, & i \le j, \\ \ell_{ij} = \left(a_{ij} - \sum_{k=1}^{j-1} \ell_{ik}u_{kj}\right)/u_{jj}, & i > j, \end{cases}$$

$$A^\star = L^\star + I + R^\star; \quad B = -(L^\star+R^\star); \quad \|L^\star+R^\star\| < 1$$

$$x = -(L^\star+I)^{-1}R^\star x + (L^\star+I)^{-1}b^\star; \quad B = -(L^\star+I)^{-1}; \qquad \text{Crit. Sassenfeld}: \beta_i < 1, \quad \beta_i = \sum_{j=1}^{i-1}|a^\star_{ij}|\beta_j + \sum_{j=i+1}^{n}|a^\star_{ij}|.$$

$$A_1 = A \to Q_1R_1;\ A_2 = R_1Q_1 \to Q_2R_2;\ \ldots A_k = R_{k-1}Q_{k-1} \to Q_kR_k.$$

$$A_1 = A;\ q_1 = \text{tr}(A_1);\ B_1 = A_1 - q_1I;\ \ldots A_n = AB_{n-1};\ q_n = \text{tr}(A_n)/n;\ B_n = A_n - q_nI;$$

$$s_k = \text{tr}(A^k) = \sum_{i=1}^{n}\lambda_i^k;\ P(\lambda) = (-1)^n[\lambda^n - p_1\lambda^{n-1} - \cdots - p_{n-1}\lambda - p_n];\ kp_k = s_k - p_1s_{k-1} - \ldots - p_{k-1}s_1.$$

$$Q_k = \lambda_k^{n-1}I - \lambda_k^{n-2}B_1 + \cdots + \lambda_kB_{n-2} - B_{n-1}.$$

$$G_ij = \begin{bmatrix} 1 & & & & \\ & c & & s & \\ & & 1 & & \\ & -s & & c & \\ & & & & 1 \end{bmatrix}.$$