Formulário

$$\begin{aligned} l_k(x) &= \frac{(x-x_0)(x-x_1)\cdots(x-x_{k-1})(x-x_k)\cdots(x-x_n)}{(x_k-x_0)(x_k-x_1)\cdots(x_k-x_{k-1})(x_k-x_{k+1})\cdots(x_k-x_n)} \\ &= \prod_{j=0, j\neq k}^{n} \frac{(x-x_j)}{(x_k-x_j)} \end{aligned}$$

$$P_n(x) = \sum_{k=0}^{n} l_k(x) f(x_k) = l_0(x)f(x_0) + l_1(x)f(x_1) + \cdots + l_n(x)f(x_n)$$

$$E_n(x) = f(x) - P_n(x) = (x-x_0)(x-x_1)\cdots(x-x_n)\frac{f^{(n+1)}(\xi_x)}{(n+1)!} \text{ onde } \xi_x \in [x_0,\ x_n]$$

$$g(x) = \alpha_0\phi_0(x) + \alpha_1\phi_1(x) + \cdots + \alpha_m\phi_m(x)$$

$$\begin{bmatrix} (\Phi_0,\Phi_0) & (\Phi_0,\Phi_1) & \cdots & \cdots & (\Phi_0,\Phi_m) \\ (\Phi_1,\Phi_0) & (\Phi_1,\Phi_1) & \cdots & \cdots & (\Phi_1,\Phi_m) \\ \vdots & \vdots & \cdots & \cdots & \vdots \\ \vdots & \vdots & \cdots & \cdots & \vdots \\ (\Phi_m,\Phi_0) & (\Phi_m,\Phi_1) & \cdots & \cdots & (\Phi_m,\Phi_m) \end{bmatrix} \begin{bmatrix} \alpha_0 \\ \alpha_1 \\ \vdots \\ \vdots \\ \alpha_m \end{bmatrix} = \begin{bmatrix} (\mathbf{f},\Phi_0) \\ (\mathbf{f},\Phi_1) \\ \vdots \\ \vdots \\ (\mathbf{f},\Phi_m) \end{bmatrix}$$

$$\int_{x_0}^{x_2} f(x)dx = \frac{h}{3}\left[f(x_0) + 4f(x_1) + f(x_2)\right] - \frac{h^5}{90} f^{(iv)}(\eta)$$

$$\int_{x_0}^{x_1} f(x)dx = \frac{h}{2}\left[f(x_0) + f(x_1)\right] - \frac{h^3}{12} f''(\eta)$$

$$\int_a^b f(x)dx = \frac{h}{2}\left[f(x_0) + f(x_N) + \sum_{j=1}^{N-1} 2f(x_j)\right] - \frac{(b-a)}{12} h^2 f''(\xi) \quad \text{onde} \quad \xi \in [a,\ b]$$

$$\int_a^b f(x)dx = \frac{h}{3}\left[f(x_0) + f(x_N) + 4\sum_{j=1}^{N/2} f(x_{2j-1}) + 2\sum_{j=1}^{N/2-1} f(x_{2j})\right] - \frac{Nh^5}{180} f^{(4)}(\xi) \qquad \xi \in [a,\ b].$$

$$\int_a^b f(x)w(x)dx = \sum_{k=0}^{n} A_k f(x_k)$$

Formula de recorrência para polinômios ortogonais

$$\phi_0(x) = 1\ , \qquad \phi_1(x) = x\phi_0(x) + \alpha_0\phi_0(x)\ , \qquad \alpha_0 = -\frac{(x\phi_0(x), \phi_0(x))}{(\phi_0(x), \phi_0(x))},$$

$$\phi_{n+1}(x) = x\phi_n(x) + \alpha_n\phi_n(x) + \beta_n\phi_{n-1}(x), \quad n = 1, 2, \cdots$$

$$\alpha_n = -\frac{(x\phi_n(x), \phi_n(x))}{(\phi_n(x), \phi_n(x))}, \quad \beta_n = -\frac{(x\phi_n(x), \phi_{n-1}(x))}{(\phi_{n-1}(x), \phi_{n-1}(x))}$$

$$y_{n+1} = y_n + hy'_n = y_n + hf(x_n, y_n)$$

$$y_{n+1} = y_n + hy'_n + \frac{h^2}{2} y''_n + \cdots\ , \qquad y'_n = f_n, \quad y''_n = (f_x + f_y f)_n$$

$$y_{n+1} = y_n + \frac{h}{2}\left[f(x_n, y_n) + f(x_n + h, y_n + hy'_n)\right], \quad n = 0, 1, 2, \cdots$$