Formüller

Newton-Raphson: $x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$ Secant Metodu: $x_{n+1} = x_n - \dfrac{f(x_n)}{\left[f(x_n) - f(x_{n-1})\right]/(x_n - x_{n-1})}$

Newton Değiştirilmiş: $x_{n+1} = x_n - \dfrac{u(x_n)}{u'(x_n)}$; $u(x) = \dfrac{f(x)}{f'(x)}$

Dikdörtgenler Kuralı: $\int_a^b f(x)dx \approx h\left[f(c_0) + f(c_1) + \ldots\ldots + f(c_{n-1})\right]$ $c_{j-1} = \dfrac{x_j + x_{j-1}}{2}$

Yamuklar Kuralı: $\int_a^b f(x)dx \approx \dfrac{b-a}{2n}\left[y_0 + 2y_1 + 2y_2 \ldots\ldots + 2y_{n-1} + y_n\right]$

Simpson Kuralı: $\int_a^b f(x)dx \approx \dfrac{b-a}{3n}\left[y_0 + 4y_1 + 2y_2 + 4y_3 + 2y_4 \ldots\ldots\ldots + 2y_{n-2} + 4y_{n-1} + y_n\right]$

İleri Farklar ile Diferansiyel Formülleri: $f_i' = \dfrac{f_{i+1} - f_i}{h} + O(h)$ $f_i'' = \dfrac{f_{i+2} - 2f_{i+1} + f_i}{h^2} + O(h)$

Geri Farklar ile Diferansiyel Formülleri: $f_i' = \dfrac{f_i - f_{i-1}}{h} + O(h)$ $f_i'' = \dfrac{f_i - 2f_{i-1} + f_{i-2}}{h^2} + O(h)$

Merkezi Farklar ile Diferansiyel Formülleri: $f_i' = \dfrac{f_{i+1} - f_{i-1}}{2h} + O(h^2)$ $f_i'' = \dfrac{f_{i+1} - 2f_i + f_{i-1}}{h^2} + O(h^2)$

Gregory-Newton:

$$f(x) = f(x_n) + \frac{(x-x_n)}{h}\Delta f_n + \frac{(x-x_n)\left[(x-x_n)-h\right]}{2!h^2}\Delta^2 f_n + \frac{(x-x_n)\left[(x-x_n)-h\right]\left[(x-x_n)-2h\right]}{3!h^3}\Delta^3 f_n + \ldots\ldots\ldots .$$

$$f(x) = f(x_n) + \frac{(x-x_n)}{h}\nabla f_n + \frac{(x-x_n)\left[(x-x_n)+h\right]}{2!h^2}\nabla^2 f_n + \frac{(x-x_n)\left[(x-x_n)+h\right]\left[(x-x_n)+2h\right]}{3!h^3}\nabla^3 f_n + \ldots\ldots\ldots .$$

Lagrange Polinomu: $$P_j(x) = \frac{\prod\limits_{\substack{i=0\\ i\neq j}}^{n}(x - x_i)}{\prod\limits_{\substack{i=0\\ i\neq j}}^{n}(x_j - x_i)}$$

Kübik Spline

$$f_i(x) = \frac{f''(x_{i-1})}{6(x_i - x_{i-1})}(x_i - x)^3 + \frac{f''(x_i)}{6(x_i - x_{i-1})}(x - x_{i-1})^3 + \left[\frac{f(x_{i-1})}{x_i - x_{i-1}} - \frac{f''(x_{i-1})(x_i - x_{i-1})}{6}\right](x_i - x) +$$
$$\left[\frac{f(x_i)}{x_i - x_{i-1}} - \frac{f''(x_i)(x_i - x_{i-1})}{6}\right](x - x_{i-1})$$

$$(x_i - x_{i-1})f''(x_{i-1}) + 2(x_{i+1} - x_{i-1})f''(x_i) + (x_{i+1} - x_i)f''(x_{i+1}) = \frac{6}{(x_{i+1} - x_i)}\left[f(x_{i+1}) - f(x_i)\right] + \frac{6}{(x_i - x_{i-1})}\left[f(x_{i-1}) - f(x_i)\right]$$

Runge-Kutta: $k_1 = hf_1(x_n, y_n, p_n)$ $l_1 = hf_2(x_n, y_n, p_n)$ $k_2 = hf_1\left(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_1, p_n + \frac{1}{2}l_1\right)$

$l_2 = hf_2\left(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_1, p_n + \frac{1}{2}l_1\right)$ $k_3 = hf_1\left(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_2, p_n + \frac{1}{2}l_2\right)$ $l_3 = hf_2\left(x_n + \frac{1}{2}h, y_n + \frac{1}{2}k_2, p_n + \frac{1}{2}l_2\right)$

$k_4 = hf_1(x_n + h, y_n + k_3, p_n + l_3)$ $l_4 = hf_2(x_n + h, y_n + k_3, p_n + l_3)$

$y_{n+1} = y_n + \frac{1}{6}(k_1 + 2k_2 + 2k_3 + k_4)$ $p_{n+1} = p_n + \frac{1}{6}(l_1 + 2l_2 + 2l_3 + l_4)$

Runge-Kutta-Nystrom: $A_j = \frac{1}{2}hf(x_j, y_j, y'_j)$ $B_j = \frac{1}{2}hf\left[x_j + \frac{1}{2}h, y_j + \frac{1}{2}h(y'_j + \frac{1}{2}A_j), y'_j + A_j\right]$

$$C_j = \frac{1}{2}hf\left[x_j + \frac{1}{2}h, y_j + \frac{1}{2}h(y'_j + \frac{1}{2}A_j), y'_j + B_j\right] \qquad D_j = \frac{1}{2}hf\left[x_j + h, y_j + h(y'_j + C_j), y'_j + 2C_j\right]$$

$$y_{j+1} = y_j + h\left[y'_j + \frac{1}{3}\left(A_j + B_j + C_j\right)\right] \qquad y'_{j+1} = y'_j + \frac{1}{3}\left[A_j + 2B_j + 2C_j + D_j\right]$$