Zu approximierende Funktion

$$f(x) = \frac{1}{(1 + x^2)}$$

Berechnung der Entwicklungskoeffizienten

$$c_k = \frac{2}{\pi}\int_0^{\pi} f(\cos(\varphi))cos(k\varphi)d\varphi, \qquad k = 0,1,2,\ldots,n.$$

$$c_k = \frac{2}{\pi}\int_0^{\pi} \frac{1}{(1 + \cos^2(\varphi))} * cos(k\varphi)d\varphi, \qquad k = 0, 1, 2, \ldots, 10.$$

Bildung des Approximationspolynoms

$$g_n(x) = \frac{1}{2}c_0T_0(x) + \sum_{k=1}^{n} c_kT_k(x)$$

Tschebyscheff - Polynome

$$T_0(x) = 1$$
$$T_1(x) = x$$
$$T_2(x) = 2x^2 - 1$$
$$T_3(x) = 4x^3 - 3x$$
$$T_4(x) = 8x^4 - 8x^2 + 1$$
$$T_5(x) = 16x^5 - 20x^3 + 5x$$
$$T_6(x) = 32x^6 - 48x^4 + 18x^2 - 1$$
$$T_7(x) = 64x^7 - 112x^5 + 56x^3 - 7x$$
$$T_8(x) = 128x^8 - 256x^6 + 160x^4 - 32x^2 + 1$$
$$T_9(x) = 256x^9 - 576x^7 + 432x^5 - 120x^3 + 9x$$
$$T_{10}(x) = 512x^{10} - 1280x^8 + 1120x^6 - 400x^4 + 50x^2 - 1$$