

数値解析 (塩田)

— ルジャンドル多項式 —

- $P_0(x) = 1$
- $P_1(x) = x$
実根 $\{t_k\} : \{0.\}$
重み $\{c_k\} : \{2.\}$
- $P_2(x) = -\frac{1}{2} + \frac{3x^2}{2}$
実根 $\{t_k\} : \{-0.5773502691896257, 0.5773502691896257\}$
重み $\{c_k\} : \{1., 1.\}$
- $P_3(x) = \frac{-3x}{2} + \frac{5x^3}{2}$
実根 $\{t_k\} : \{-0.7745966692414834, 0., 0.7745966692414834\}$
重み $\{c_k\} : \{0.5555555555555554, 0.888888888888892, 0.555555555555554\}$
- $P_4(x) = \frac{3}{8} - \frac{15x^2}{4} + \frac{35x^4}{8}$
実根 $\{t_k\} : \{-0.8611363115940525, -0.33998104358485637, 0.3399810435848563, 0.8611363115940526\}$
重み $\{c_k\} : \{0.34785484513745396, 0.6521451548625455, 0.6521451548625464, 0.34785484513745385\}$
- $P_5(x) = \frac{15x}{8} - \frac{35x^3}{4} + \frac{63x^5}{8}$
実根 $\{t_k\} : \{-0.9061798459386641, -0.538469310105683, 0., 0.538469310105683, 0.9061798459386641\}$
重み $\{c_k\} : \{0.23692688505618917, 0.4786286704993664, 0.568888888888882, 0.4786286704993666, 0.2369268850561891\}$
- $P_6(x) = -\frac{5}{16} + \frac{105x^2}{16} - \frac{315x^4}{16} + \frac{231x^6}{16}$
実根 $\{t_k\} : \{-0.93247, -0.661209, -0.238619, 0.238619, 0.661209, 0.93247\}$
重み $\{c_k\} : \{0.171324, 0.360762, 0.467914, 0.467914, 0.360762, 0.171324\}$
- $P_7(x) = \frac{-35x}{16} + \frac{315x^3}{16} - \frac{693x^5}{16} + \frac{429x^7}{16}$
実根 $\{t_k\} : \{-0.949108, -0.741531, -0.405845, 0., 0.405845, 0.741531, 0.949108\}$
重み $\{c_k\} : \{0.129485, 0.279705, 0.38183, 0.417959, 0.38183, 0.279705, 0.129485\}$
- $P_8(x) = \frac{35}{128} - \frac{315x^2}{32} + \frac{3465x^4}{64} - \frac{3003x^6}{32} + \frac{6435x^8}{128}$
実根 $\{t_k\} : \{-0.96029, -0.796666, -0.525532, -0.183435, 0.183435, 0.525532, 0.796666, 0.96029\}$
重み $\{c_k\} : \{0.101229, 0.222381, 0.313707, 0.362684, 0.362684, 0.313707, 0.222381, 0.101229\}$
- $P_9(x) = \frac{315x}{128} - \frac{1155x^3}{32} + \frac{9009x^5}{64} - \frac{6435x^7}{32} + \frac{12155x^9}{128}$
実根 $\{t_k\} : \{-0.96816, -0.836031, -0.613371, -0.324253, 0., 0.324253, 0.613371, 0.836031, 0.96816\}$
重み $\{c_k\} : \{0.0812744, 0.180648, 0.260611, 0.312347, 0.330239, 0.312347, 0.260611, 0.180648, 0.0812744\}$
- $P_{10}(x) = -\frac{63}{256} + \frac{3465x^2}{256} - \frac{15015x^4}{128} + \frac{45045x^6}{128} - \frac{109395x^8}{256} + \frac{46189x^{10}}{256}$
実根 $\{t_k\} : \{-0.973907, -0.865063, -0.67941, -0.433395, -0.148874, 0.148874, 0.433395, 0.67941, 0.865063, 0.973907\}$
重み $\{c_k\} : \{0.0666713, 0.149451, 0.219086, 0.269267, 0.295524, 0.295524, 0.269267, 0.219086, 0.149451, 0.0666713\}$