

LEGENDRE FUNCTIONS

LEGENDRE FUNCTION—FIRST KIND $P_n(x)$

Table 8.1

		$P_0(x) = 1$	$P_1(x) = x$		
x	arccos x	$P_2(x)$	$P_3(x)$	$P_9(x)$	$P_{10}(x)$
0.50	60.00000 00	-0.12500	-0.43750 00	-0.26789 856	-0.18822 86
0.51	59.33617 03	-0.10985	-0.43337 25	-0.25900 667	-0.21010 83
0.52	58.66774 85	-0.09440	-0.42848 00	-0.24682 215	-0.22914 92
0.53	57.99454 51	-0.07865	-0.42280 75	-0.23139 939	-0.24498 73
0.54	57.31636 11	-0.06260	-0.41634 00	-0.21283 321	-0.25728 92
0.55	56.63298 70	-0.04625	-0.40906 25	-0.19126 025	-0.26575 85
0.56	55.94420 22	-0.02960	-0.40096 00	-0.16686 000	-0.27014 28
0.57	55.24977 42	-0.01265	-0.39201 75	-0.13985 552	-0.27023 97
0.58	54.54945 74	+0.00460	-0.38222 00	-0.11051 366	-0.26590 30
0.59	53.84299 18	0.02215	-0.37155 25	-0.07914 497	-0.25704 92
0.60	53.13010 24	0.04000	-0.36000 00	-0.04610 304	-0.24366 27
0.61	52.41049 70	0.05815	-0.34754 75	-0.01178 332	-0.22580 16
0.62	51.68386 55	0.07660	-0.33418 00	+0.02337 862	-0.20360 19
0.63	50.94987 75	0.09535	-0.31988 25	0.05890 951	-0.17728 16
0.64	50.20818 05	0.11440	-0.30464 00	0.09430 141	-0.14714 41
0.65	49.45839 81	0.13375	-0.28843 75	0.12901 554	-0.11358 05
0.66	48.70012 72	0.15340	-0.27126 00	0.16248 693	-0.07707 01
0.67	47.93293 52	0.17335	-0.25309 25	0.19412 981	-0.03818 08
0.68	47.15635 69	0.19360	-0.23392 00	0.22334 410	+0.00243 30
0.69	46.36989 11	0.21415	-0.21372 75	0.24952 270	0.04403 37
0.70	45.57299 60	0.23500	-0.19250 00	0.27205 993	0.08580 58
0.71	44.76508 47	0.25615	-0.17022 25	0.29036 111	0.12686 31
0.72	43.94551 96	0.27760	-0.14688 00	0.30385 323	0.16625 89
0.73	43.11360 59	0.29935	-0.12245 75	0.31199 698	0.20299 76
0.74	42.26858 44	0.32140	-0.09694 00	0.31430 004	0.23605 08
0.75	41.40962 21	0.34375	-0.07031 25	0.31033 185	0.26437 45
0.76	40.53580 21	0.36640	-0.04256 00	0.29973 981	0.28693 19
0.77	39.64611 11	0.38935	-0.01366 75	0.28226 712	0.30271 79
0.78	38.73942 46	0.41260	+0.01638 00	0.25777 224	0.31078 93
0.79	37.81448 85	0.43615	0.04759 75	0.22625 012	0.31029 79
0.80	36.86989 76	0.46000	0.08000 00	0.18785 528	0.30052 98
0.81	35.90406 86	0.48415	0.11360 25	0.14292 678	0.28094 87
0.82	34.91520 62	0.50860	0.14842 00	0.09201 529	0.25124 52
0.83	33.90126 20	0.53335	0.18446 75	+0.03591 226	0.21139 19
0.84	32.85988 04	0.55840	0.22176 00	-0.02431 874	0.16170 50
0.85	31.78833 06	0.58375	0.26031 25	-0.08730 820	0.10291 23
0.86	30.68341 71	0.60940	0.30014 00	-0.15134 456	+0.03622 91
0.87	29.54136 05	0.63535	0.34125 75	-0.21433 544	-0.03655 86
0.88	28.35763 66	0.66160	0.38368 00	-0.27376 627	-0.11300 29
0.89	27.12675 31	0.68815	0.42742 25	-0.32665 610	-0.18989 29
0.90	25.84193 28	0.71500	0.47250 00	-0.36951 049	-0.26314 56
0.91	24.49464 85	0.74215	0.51892 75	-0.39827 146	-0.32768 58
0.92	23.07391 81	0.76960	0.56672 00	-0.40826 421	-0.37731 58
0.93	21.56518 50	0.79735	0.61589 25	-0.39414 060	-0.40457 43
0.94	19.94844 36	0.82540	0.66646 00	-0.34981 919	-0.40058 29
0.95	18.19487 23	0.85375	0.71843 75	-0.26842 182	-0.35488 03
0.96	16.26020 47	0.88240	0.77184 00	-0.14220 642	-0.25524 34
0.97	14.06986 77	0.91135	0.82668 25	+0.03750 397	-0.08749 40
0.98	11.47834 09	0.94060	0.88298 00	0.28039 609	+0.16470 81
0.99	8.10961 44	0.97015	0.94074 75	0.59724 553	0.52008 90

1.00	0.00000 00	1.00000	1.00000 00	1.00000 000	1.00000 00
		$\left[\begin{smallmatrix} (-5)4 \\ 3 \end{smallmatrix} \right]$	$\left[\begin{smallmatrix} (-4)2 \\ 4 \end{smallmatrix} \right]$	$\left[\begin{smallmatrix} (-2)1 \\ 7 \end{smallmatrix} \right]$	$\left[\begin{smallmatrix} (-2)2 \\ 7 \end{smallmatrix} \right]$

$$P_2(x) = \frac{1}{2}(-1 + 3x^2) \quad P_3(x) = \frac{x}{2}(-3 + 5x^2)$$

$$P_9(x) = \frac{x}{512}(1260 - 18480x^2 + 72072x^4 - 102960x^6 + 48620x^8)$$

$$P_{10}(x) = \frac{1}{1024}(-252 + 13860x^2 - 120120x^4 + 360360x^6 - 437580x^8 + 184756x^{10})$$

$$(n+1)P_{n+1}(x) = (2n+1)xP_n(x) - nP_{n-1}(x)$$

For coefficients of other polynomials, see chapter 22.