

Regions	(a,b)=(0,1) (c,d)=(0,1)	(a,b)=(1,2) (c,d)=(3,4)	(a,b)=(-2,2) (c,d)=(0,3)	(a,b)=(-10,10) (c,d)=(0,15)	(a,b)=(10,20) (c,d)=(0,15)
(MAXTERMS, MAXDEGREE)	(20,20)	(15,15)	(10,10)	(15,15)	(15,15)
Number of Subregions	1	1	9	45	80
Approximation Generation Time (s)	5.932	7.748	56.723	772.560	960.540
$\ f\ _\infty$	1.00	23.50	13.00	1.03e14	4.28e28
Max Error ($\ f - approx\ _\infty / \max(\ f\ _\infty, 1)$)	1.40e-15	9.62e-16	3.13e-15	3.21e-09	1.65e-13
Original Maple Time (s)	1.792	4.792	3.172	4.756	5.344
evalf Time (s)	9.773	8.353	11.373	21.333	21.769
evalhf Time (s)	1.172	1.024	1.224	2.341	2.112
Compiled Time (s)	0.116	0.108	0.128	0.196	0.188
Speedup Factor (origMaple/evalf)	-	-	-	-	-
Speedup Factor (evalf/evalhf)	8.339	8.157	9.289	9.111	10.31
Speedup Factor (evalhf/compiled)	10.10	9.481	9.562	11.94	11.23
Overall Speedup (origMaple/compiled)	15.45	44.37	24.78	24.27	28.43
Original Maple Plot Time (s)	0.256	0.832	0.768	0.888	0.732
Approximation Plot Time (s)	0.024	0.020	0.028	0.036	0.032
Plot Speedup Factor	10.67	41.60	27.43	24.67	22.88

Table 7.9: Timings and Errors for Approximating LegendreP(x, y) Using Rational Approximation

Regions	(a,b)=(0,1) (c,d)=(0,1)	(a,b)=(-2,2) (c,d)=(0,3)	(a,b)=(-2,2) (c,d)=(0,3)	(a,b)=(-10,10) (c,d)=(0,15)	(a,b)=(10,20) (c,d)=(0,15)
(MAXTERMS, MAXDEGREE)	(15,30)	(10,15)	(15,25)	(20,30)	(20,30)
Number of Subregions	1	23	3	34	6
Approximation Generation Time (s)	4.028	102.274	27.101	394.052	85.669
$\ f\ _\infty$	1.00	13.00	13.00	1.03e14	4.28e28
Max Error ($\ f - approx\ _\infty / \max(\ f\ _\infty, 1)$)	1.08e-15	5.23e-16	3.18e-15	1.46e-15	3.06e-15
Original Maple Time (s)	1.844	3.104	3.156	4.740	5.028
evalf Time (s)	12.077	9.257	14.437	23.742	20.265
evalhf Time (s)	1.408	0.948	1.696	2.428	2.313
Compiled Time (s)	0.140	0.112	0.152	0.204	0.180
Speedup Factor (origMaple/evalf)	-	-	-	-	-
Speedup Factor (evalf/evalhf)	8.580	9.765	8.514	9.778	8.759
Speedup Factor (evalhf/compiled)	10.06	8.464	11.16	11.90	12.85
Overall Speedup (origMaple/compiled)	13.17	27.71	20.76	23.24	27.93
Original Maple Plot Time (s)	0.292	0.508	0.676	0.980	0.900
Approximation Plot Time (s)	0.032	0.024	0.028	0.036	0.032
Plot Speedup Factor	9.125	21.17	24.14	27.22	28.12

Table 7.10: Timings and Errors for Approximating LegendreP(x, y) Using Polynomial Approximation