

Table 9.5

ZEROS AND ASSOCIATED VALUES OF BESSEL FUNCTIONS AND THEIR DERIVATIVES

s	$j_{0,s}$	$J'_0(j_{0,s})$	$j_{1,s}$	$J'_1(j_{1,s})$	$j_{2,s}$	$J'_2(j_{2,s})$
1	2.40482 55577	-0.51914 74973	3.83171	-0.40276	5.13562	-0.33967
2	5.52007 81103	+0.34026 48065	7.01559	+0.30012	8.41724	+0.27138
3	8.65372 79129	-0.27145 22999	10.17347	-0.24970	11.61984	-0.23244
4	11.79153 44391	+0.23245 98314	13.32369	+0.21836	14.79595	+0.20654
5	14.93091 77086	-0.20654 64331	16.47063	-0.19647	17.95982	-0.18773
6	18.07106 39679	+0.18772 88030	19.61586	+0.18006	21.11700	+0.17326
7	21.21163 66299	-0.17326 58942	22.76008	-0.16718	24.27011	-0.16170
8	24.35247 15308	+0.16170 15507	25.90367	+0.15672	27.42057	+0.15218
9	27.49347 91320	-0.15218 12138	29.04683	-0.14801	30.56920	-0.14417
10	30.63460 64684	+0.14416 59777	32.18968	+0.14061	33.71652	+0.13730
11	33.77582 02136	-0.13729 69434	35.33231	-0.13421	36.86286	-0.13132
12	36.91709 83537	+0.13132 46267	38.47477	+0.12862	40.00845	+0.12607
13	40.05842 57646	-0.12606 94971	41.61709	-0.12367	43.15345	-0.12140
14	43.19979 17132	+0.12139 86248	44.75932	+0.11925	46.29800	+0.11721
15	46.34118 83717	-0.11721 11989	47.90146	-0.11527	49.44216	-0.11343
16	49.48260 98974	+0.11342 91926	51.04354	+0.11167	52.58602	+0.10999
17	52.62405 18411	-0.10999 11430	54.18555	-0.10839	55.72963	-0.10685
18	55.76551 07550	+0.10684 78883	57.32753	+0.10537	58.87302	+0.10396
19	58.90698 39261	-0.10395 95729	60.46946	-0.10260	62.01622	-0.10129
20	62.04846 91902	+0.10129 34989	63.61136	+0.10004	65.15927	+0.09882

s	$j_{3,s}$	$J'_3(j_{3,s})$	$j_{4,s}$	$J'_4(j_{4,s})$	$j_{5,s}$	$J'_5(j_{5,s})$
1	6.38016	-0.29827	7.58834	-0.26836	8.77148	-0.24543
2	9.76102	+0.24942	11.06471	+0.23188	12.33860	+0.21743
3	13.01520	-0.21828	14.37254	-0.20636	15.70017	-0.19615
4	16.22347	+0.19644	17.61597	+0.18766	18.98013	+0.17993
5	19.40942	-0.18005	20.82693	-0.17323	22.21780	-0.16712
6	22.58273	+0.16718	24.01902	+0.16168	25.43034	+0.15669
7	25.74817	-0.15672	27.19909	-0.15217	28.62662	-0.14799
8	28.90835	+0.14801	30.37101	+0.14416	31.81172	+0.14059
9	32.06485	-0.14060	33.53714	-0.13729	34.98878	-0.13420
10	35.21867	+0.13421	36.69900	+0.13132	38.15987	+0.12861
11	38.37047	-0.12862	39.85763	-0.12607	41.32638	-0.12366
12	41.52072	+0.12367	43.01374	+0.12140	44.48932	+0.11925
13	44.66974	-0.11925	46.16785	-0.11721	47.64940	-0.11527
14	47.81779	+0.11527	49.32036	+0.11343	50.80717	+0.11167
15	50.96503	-0.11167	52.47155	-0.10999	53.96303	-0.10838
16	54.11162	+0.10839	55.62165	+0.10685	57.11730	+0.10537
17	57.25765	-0.10537	58.77084	-0.10396	60.27025	-0.10260
18	60.40322	+0.10260	61.91925	+0.10129	63.42205	+0.10003
19	63.54840	-0.10004	65.06700	-0.09882	66.57289	-0.09765
20	66.69324	+0.09765	68.21417	+0.09652	69.72289	+0.09543

s	$j_{6,s}$	$J'_6(j_{6,s})$	$j_{7,s}$	$J'_7(j_{7,s})$	$j_{8,s}$	$J'_8(j_{8,s})$
1	9.93611	-0.22713	11.08637	-0.21209	12.22509	-0.19944
2	13.58929	+0.20525	14.82127	+0.19479	16.03777	+0.18569
3	17.00382	-0.18726	18.28758	-0.17942	19.55454	-0.17244
4	20.32079	+0.17305	21.64154	+0.16688	22.94517	+0.16130
5	23.58608	-0.16159	24.93493	-0.15657	26.26681	-0.15196
6	26.82015	+0.15212	28.19119	+0.14792	29.54566	+0.14404
7	30.03372	-0.14413	31.42279	-0.14055	32.79580	-0.13722
8	33.23304	+0.13727	34.63709	+0.13418	36.02562	+0.13127
9	36.42202	-0.13131	37.83872	-0.12859	39.24045	-0.12603
10	39.60324	+0.12606	41.03077	+0.12365	42.44389	+0.12137
11	42.77848	-0.12139	44.21541	-0.11924	45.63844	-0.11719
12	45.94902	+0.11721	47.39417	+0.11526	48.82593	+0.11342
13	49.11577	-0.11343	50.56818	-0.11166	52.00769	-0.10998
14	52.27945	+0.10999	53.73833	+0.10838	55.18475	+0.10684
15	55.44059	-0.10685	56.90525	-0.10537	58.35789	-0.10395
16	58.59961	+0.10396	60.06948	+0.10260	61.52774	+0.10129
17	61.75682	-0.10129	63.23142	-0.10003	64.69478	-0.09882
18	64.91251	+0.09882	66.39141	+0.09765	67.85943	+0.09652
19	68.06689	-0.09652	69.54971	-0.09543	71.02200	-0.09438
20	71.22013	+0.09438	72.70655	+0.09336	74.18277	+0.09237

Table 9.5

ZEROS AND ASSOCIATED VALUES OF BESSEL FUNCTIONS AND THEIR DERIVATIVES

s	$y_{0,s}$	$Y'_0(y_{0,s})$	$y_{1,s}$	$Y'_1(y_{1,s})$	$y_{2,s}$	$Y'_2(y_{2,s})$
1	0.89357 697	+0.87942 080	2.19714	+0.52079	3.38424	+0.39921
2	3.95767 842	-0.40254 267	5.42968	-0.34032	6.79381	-0.29992
3	7.08605 106	+0.30009 761	8.59601	+0.27146	10.02348	+0.24967
4	10.22234 504	-0.24970 124	11.74915	-0.23246	13.20999	-0.21835
5	13.36109 747	+0.21835 830	14.89744	+0.20655	16.37897	+0.19646
6	16.50092 244	-0.19646 494	18.04340	-0.18773	19.53904	-0.18006
7	19.64130 970	+0.18006 318	21.18807	+0.17327	22.69396	+0.16718
8	22.78202 805	-0.16718 450	24.33194	-0.16170	25.84561	-0.15672
9	25.92295 765	+0.15672 493	27.47529	+0.15218	28.99508	+0.14801
10	29.06403 025	-0.14801 108	30.61829	-0.14417	32.14300	-0.14061
11	32.20520 412	+0.14060 578	33.76102	+0.13730	35.28979	+0.13421
12	35.34645 231	-0.13421 123	36.90356	-0.13132	38.43573	-0.12862
13	38.48775 665	+0.12861 661	40.04594	+0.12607	41.58101	+0.12367
14	41.62910 447	-0.12366 795	43.18822	-0.12140	44.72578	-0.11925
15	44.77048 661	+0.11924 981	46.33040	+0.11721	47.87012	+0.11527
16	47.91189 633	-0.11527 369	49.47251	-0.11343	51.01413	-0.11167
17	51.05332 855	+0.11167 049	52.61455	+0.10999	54.15785	+0.10839
18	54.19477 936	-0.10838 535	55.75654	-0.10685	57.30135	-0.10537
19	57.33624 570	+0.10537 405	58.89850	+0.10396	60.44464	+0.10260
20	60.47772 516	-0.10260 057	62.04041	-0.10129	63.58777	-0.10004
s	$y_{3,s}$	$Y'_3(y_{3,s})$	$y_{4,s}$	$Y'_4(y_{4,s})$	$y_{5,s}$	$Y'_5(y_{5,s})$
1	4.52702	+0.33256	5.64515	+0.28909	6.74718	+0.25795
2	8.09755	-0.27080	9.36162	-0.24848	10.59718	-0.23062
3	11.39647	+0.23232	12.73014	+0.21805	14.03380	+0.20602
4	14.62308	-0.20650	15.99963	-0.19635	17.34709	-0.18753
5	17.81846	+0.18771	19.22443	+0.18001	20.60290	+0.17317
6	20.99728	-0.17326	22.42481	-0.16716	23.82654	-0.16165
7	24.16624	+0.16170	25.61027	+0.15671	27.03013	+0.15215
8	27.32880	-0.15218	28.78589	-0.14800	30.22034	-0.14415
9	30.48699	+0.14416	31.95469	+0.14060	33.40111	+0.13729
10	33.64205	-0.13730	35.11853	-0.13421	36.57497	-0.13132
11	36.79479	+0.13132	38.27867	+0.12861	39.74363	+0.12606
12	39.94577	-0.12607	41.43596	-0.12367	42.90825	-0.12140
13	43.09537	+0.12140	44.59102	+0.11925	46.06968	+0.11721
14	46.24387	-0.11721	47.74429	-0.11527	49.22854	-0.11343
15	49.39150	+0.11343	50.89611	+0.11167	52.38531	+0.10999
16	52.53840	-0.10999	54.04673	-0.10838	55.54035	-0.10685
17	55.68470	+0.10685	57.19635	+0.10537	58.69393	+0.10396
18	58.83049	-0.10396	60.34513	-0.10260	61.84628	-0.10129
19	61.97586	+0.10129	63.49320	+0.10003	64.99759	+0.09882
20	65.12086	-0.09882	66.64065	-0.09765	68.14799	-0.09652
s	$y_{6,s}$	$Y'_6(y_{6,s})$	$y_{7,s}$	$Y'_7(y_{7,s})$	$y_{8,s}$	$Y'_8(y_{8,s})$
1	7.83774	+0.23429	8.91961	+0.21556	9.99463	+0.20027
2	11.81104	-0.21591	13.00771	-0.20352	14.19036	-0.19289
3	15.31362	+0.19571	16.57392	+0.18672	17.81789	+0.17880
4	18.67070	-0.17975	19.97434	-0.17283	21.26093	-0.16662
5	21.95829	+0.16703	23.29397	+0.16148	24.61258	+0.15643
6	25.20621	-0.15664	26.56676	-0.15206	27.91052	-0.14785
7	28.42904	+0.14796	29.80953	+0.14409	31.17370	-0.14051
8	31.63488	-0.14058	33.03177	-0.13725	34.41286	-0.13415
9	34.82864	+0.13419	36.23927	+0.13130	37.63465	+0.12857
10	38.01347	-0.12860	39.43579	-0.12605	40.84342	-0.12364
11	41.19152	+0.12366	42.62391	+0.12138	44.04215	+0.11923
12	44.36427	-0.11924	45.80544	-0.11720	47.23298	-0.11526
13	47.53282	+0.11527	48.98171	+0.11342	50.41746	+0.11166
14	50.69796	-0.11167	52.15369	-0.10999	53.59675	-0.10838
15	53.86031	+0.10838	55.32215	+0.10684	56.77177	+0.10537
16	57.02034	-0.10537	58.48767	-0.10396	59.94319	-0.10260
17	60.17842	+0.10260	61.65071	+0.10129	63.11158	-0.10003
18	63.33485	-0.10003	64.81164	-0.09882	66.27738	-0.09765
19	66.48986	+0.09765	67.97075	+0.09652	69.44095	-0.09543
20	69.64364	-0.09543	71.12830	-0.09438	72.60259	-0.09336

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ZEROS AND ASSOCIATED VALUES OF BESSEL FUNCTIONS AND THEIR DERIVATIVES

s	$j'_{0,s}$	$J_0(j'_{0,s})$	$j'_{1,s}$	$J_1(j'_{1,s})$	$j'_{2,s}$	$J_2(j'_{2,s})$
1	0.00000 00000	+1.00000 00000	1.84118	+0.58187	3.05424	+0.48650
2	3.83170 59702	-0.40275 93957	5.33144	-0.34613	6.70613	-0.31353
3	7.01558 66698	+0.30011 57525	8.53632	+0.27330	9.96947	+0.25474
4	10.17346 81351	-0.24970 48771	11.70600	-0.23330	13.17037	-0.22088
5	13.32369 19363	+0.21835 94072	14.86359	+0.20701	16.34752	+0.19794
6	16.47063 00509	-0.19646 53715	18.01553	-0.18802	19.51291	-0.18101
7	19.61585 85105	+0.18006 33753	21.16437	+0.17346	22.67158	+0.16784
8	22.76008 43806	-0.16718 46005	24.31133	-0.16184	25.82604	-0.15720
9	25.90367 20876	+0.15672 49863	27.45705	+0.15228	28.97767	+0.14836
10	29.04682 85349	-0.14801 11100	30.60192	-0.14424	32.12733	-0.14088
11	32.18967 99110	+0.14060 57982	33.74618	+0.13736	35.27554	+0.13443
12	35.33230 75501	-0.13421 12403	36.88999	-0.13137	38.42265	-0.12879
13	38.47476 62348	+0.12861 66221	40.03344	+0.12611	41.56893	+0.12381
14	41.61709 42128	-0.12366 79608	43.17663	-0.12143	44.71455	-0.11937
15	44.75931 89977	+0.11924 98120	46.31960	+0.11724	47.85964	+0.11537
16	47.90146 08872	-0.11527 36941	49.46239	-0.11345	51.00430	-0.11176
17	51.04353 51836	+0.11167 04969	52.60504	+0.11001	54.14860	+0.10846
18	54.18555 36411	-0.10838 53489	55.74757	-0.10687	57.29260	-0.10544
19	57.32752 54379	+0.10537 40554	58.89000	+0.10397	60.43635	+0.10266
20	60.46945 78453	-0.10260 05671	62.03235	-0.10131	63.57989	-0.10008

s	$j'_{3,s}$	$J_3(j'_{3,s})$	$j'_{4,s}$	$J_4(j'_{4,s})$	$j'_{5,s}$	$J_5(j'_{5,s})$
1	4.20119	+0.43439	5.31755	+0.39965	6.41562	+0.37409
2	8.01524	-0.29116	9.28240	-0.27438	10.51986	-0.26109
3	11.34592	+0.24074	12.68191	+0.22959	13.98719	+0.22039
4	14.58585	-0.21097	15.96411	-0.20276	17.31284	-0.19580
5	17.78875	+0.19042	19.19603	+0.18403	20.57551	+0.17849
6	20.97248	-0.17505	22.40103	-0.16988	23.80358	-0.16533
7	24.14490	+0.16295	25.58976	+0.15866	27.01031	+0.15482
8	27.31006	-0.15310	28.76784	-0.14945	30.20285	-0.14616
9	30.47027	+0.14487	31.93854	+0.14171	33.38544	+0.13885
10	33.62695	-0.13784	35.10392	-0.13509	36.56078	-0.13256
11	36.78102	+0.13176	38.26532	+0.12932	39.73064	+0.12707
12	39.93311	-0.12643	41.42367	-0.12425	42.89627	-0.12223
13	43.08365	+0.12169	44.57962	+0.11973	46.05857	+0.11790
14	46.23297	-0.11746	47.73367	-0.11568	49.21817	-0.11402
15	49.38130	+0.11364	50.88616	+0.11202	52.37559	+0.11049
16	52.52882	-0.11017	54.03737	-0.10868	55.53120	-0.10728
17	55.67567	+0.10700	57.18752	+0.10563	58.68528	+0.10434
18	58.82195	-0.10409	60.33677	-0.10283	61.83809	-0.10163
19	61.96775	+0.10141	63.48526	+0.10023	64.98980	+0.09912
20	65.11315	-0.09893	66.63309	-0.09783	68.14057	-0.09678

s	$j'_{6,s}$	$J_6(j'_{6,s})$	$j'_{7,s}$	$J_7(j'_{7,s})$	$j'_{8,s}$	$J_8(j'_{8,s})$
1	7.50127	+0.35414	8.57784	+0.33793	9.64742	+0.32438
2	11.73494	-0.25017	12.93239	-0.24096	14.11552	-0.23303
3	15.26818	+0.21261	16.52937	+0.20588	17.77401	+0.19998
4	18.63744	-0.18978	19.94185	-0.18449	21.22906	-0.17979
5	21.93172	+0.17363	23.26805	+0.16929	24.58720	+0.16539
6	25.18393	-0.16127	26.54503	-0.15762	27.88927	-0.15431
7	28.40978	+0.15137	29.79075	+0.14823	31.15533	+0.14537
8	31.61788	-0.14317	33.01518	-0.14044	34.39663	-0.13792
9	34.81339	+0.13623	36.22438	+0.13381	37.62008	+0.13158
10	37.99964	-0.13024	39.42227	-0.12808	40.83018	-0.12608
11	41.17885	+0.12499	42.61152	+0.12305	44.03001	+0.12124
12	44.35258	-0.12035	45.79400	-0.11859	47.22176	-0.11695
13	47.52196	+0.11620	48.97107	+0.11460	50.40702	+0.11309
14	50.68782	-0.11246	52.14375	-0.11099	53.58700	-0.10960
15	53.85079	+0.10906	55.31282	+0.10771	56.76260	+0.10643
16	57.01138	-0.10596	58.47887	-0.10471	59.93454	-0.10352
17	60.16995	+0.10311	61.64239	+0.10195	63.10340	+0.10084
18	63.32681	-0.10049	64.80374	-0.09940	66.26961	-0.09837
19	66.48221	+0.09805	67.96324	+0.09704	69.43356	+0.09607
20	69.63635	-0.09579	71.12113	-0.09484	72.59554	-0.09393

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ZEROS AND ASSOCIATED VALUES OF BESSEL FUNCTIONS AND THEIR DERIVATIVES

s	$y'_{0,s}$	$Y_0(y'_{0,s})$	$y'_{1,s}$	$Y_1(y'_{1,s})$	$y'_{2,s}$	$Y_2(y'_{2,s})$
1	2.19714 133	+0.52078 641	3.68302	+0.41673	5.00258	+0.36766
2	5.42968 104	-0.34031 805	6.94150	-0.30317	8.35072	-0.27928
3	8.59600 587	+0.27145 988	10.12340	+0.25091	11.57420	+0.23594
4	11.74915 483	-0.23246 177	13.28576	-0.21897	14.76091	-0.20845
5	14.89744 213	+0.20654 711	16.44006	+0.19683	17.93129	+0.18890
6	18.04340 228	-0.18772 909	19.59024	-0.18030	21.09289	-0.17405
7	21.18806 893	+0.17326 604	22.73803	+0.16735	24.24923	+0.16225
8	24.33194 257	-0.16170 163	25.88431	-0.15684	27.40215	-0.15259
9	27.47529 498	+0.15218 126	29.02958	+0.14810	30.55271	+0.14448
10	30.61828 649	-0.14416 600	32.17412	-0.14067	33.70159	-0.13754
11	33.76101 780	+0.13729 696	35.31813	+0.13427	36.84921	+0.13152
12	36.90355 532	-0.13132 464	38.46175	-0.12866	39.99589	-0.12623
13	40.04594 464	+0.12606 951	41.60507	+0.12370	43.14182	+0.12153
14	43.18821 810	-0.12139 863	44.74814	-0.11928	46.28716	-0.11732
15	46.33039 925	+0.11721 120	47.89101	+0.11530	49.43202	+0.11352
16	49.47250 568	-0.11342 920	51.03373	-0.11169	52.57649	-0.11007
17	52.61455 077	+0.10999 115	54.17632	+0.10840	55.72063	+0.10692
18	55.75654 488	-0.10684 789	57.31880	-0.10539	58.86450	-0.10402
19	58.89849 617	+0.10395 957	60.46118	+0.10261	62.00814	+0.10135
20	62.04041 115	-0.10129 350	63.60349	-0.10005	65.15159	-0.09887

s	$y'_{3,s}$	$Y_3(y'_{3,s})$	$y'_{4,s}$	$Y_4(y'_{4,s})$	$y'_{5,s}$	$Y_5(y'_{5,s})$
1	6.25363	+0.33660	7.46492	+0.31432	8.64956	+0.29718
2	9.69879	-0.26195	11.00517	-0.24851	12.28087	-0.23763
3	12.97241	+0.22428	14.33172	+0.21481	15.66080	+0.20687
4	16.19045	-0.19987	17.58444	-0.19267	18.94974	-0.18650
5	19.38239	+0.18223	20.80106	+0.17651	22.19284	+0.17151
6	22.55979	-0.16867	23.99700	-0.16397	25.40907	-0.15980
7	25.72821	+0.15779	27.17989	+0.15384	28.60804	+0.15030
8	28.89068	-0.14881	30.35396	-0.14543	31.79520	-0.14236
9	32.04898	+0.14122	33.52180	+0.13828	34.97389	+0.13559
10	35.20427	-0.13470	36.68505	-0.13211	38.14631	-0.12973
11	38.35728	+0.12901	39.84483	+0.12671	41.31392	+0.12458
12	41.50855	-0.12399	43.00191	-0.12193	44.47779	-0.12001
13	44.65845	+0.11952	46.15686	+0.11765	47.63867	+0.11591
14	47.80725	-0.11550	49.31009	-0.11380	50.79713	-0.11221
15	50.95515	+0.11186	52.46191	+0.11031	53.95360	+0.10885
16	54.10232	-0.10855	55.61257	-0.10712	57.10841	-0.10578
17	57.24887	+0.10552	58.76225	+0.10420	60.26183	+0.10295
18	60.39491	-0.10273	61.91110	-0.10151	63.41407	-0.10035
19	63.54050	+0.10015	65.05925	+0.09901	66.56530	+0.09793
20	66.68571	-0.09775	68.20679	-0.09669	69.71565	-0.09568

s	$y'_{6,s}$	$Y_6(y'_{6,s})$	$y'_{7,s}$	$Y_7(y'_{7,s})$	$y'_{8,s}$	$Y_8(y'_{8,s})$
1	9.81480	+0.28339	10.96515	+0.27194	12.10364	+0.26220
2	13.53281	-0.22854	14.76569	-0.22077	15.98284	-0.21402
3	16.96553	+0.20007	18.25012	+0.19414	19.51773	+0.18891
4	20.29129	-0.18111	21.61275	-0.17634	22.91696	-0.17207
5	23.56186	+0.16708	24.91131	+0.16311	26.24370	+0.15953
6	26.79950	-0.15607	28.17105	-0.15269	29.52596	-0.14962
7	30.01567	+0.14709	31.40518	+0.14417	32.77857	+0.14149
8	33.21697	-0.13957	34.62140	-0.13700	36.01026	-0.13463
9	36.40752	+0.13313	37.82455	+0.13085	39.22658	+0.12874
10	39.59002	-0.12753	41.01785	-0.12549	42.43122	-0.12359
11	42.76632	+0.12260	44.20351	+0.12076	45.62678	+0.11904
12	45.93775	-0.11822	47.38314	-0.11654	48.81512	-0.11497
13	49.10528	+0.11428	50.55791	+0.11275	51.99761	+0.11131
14	52.26963	-0.11072	53.72870	-0.10931	55.17529	-0.10798
15	55.43136	+0.10748	56.89619	+0.10618	58.34899	+0.10494
16	58.59089	-0.10451	60.06092	-0.10330	61.51933	-0.10216
17	61.74857	+0.10177	63.22331	+0.10065	64.68681	+0.09958
18	64.90468	-0.09925	66.38370	-0.09820	67.85185	-0.09720
19	68.05943	+0.09690	69.54237	+0.09592	71.01478	+0.09498
20	71.21301	-0.09471	72.69955	-0.09379	74.17587	-0.09291