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MATHEMATISCH CENTRUM
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AMSTERDAM

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Technical Note TN 28

Table of the function $B(k,\varphi) = \int_0^{\varphi} \frac{\cos^2\varphi}{(1-k^2\sin\varphi)^{\frac{1}{2}}}\, d\varphi$

by

R.P. van de Riet

November 1962

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In this note a table in 11 decimals, from the function

$B(k,\varphi)= \int_0^{\varphi} \frac{\cos^2\varphi}{(1-k^2\sin^2\varphi)^{\frac{1}{2}}}\, d\varphi$, is published, where

$k=\sin\{1^\circ(1^\circ)45^\circ\}$ and $\varphi=\sin\{1^\circ(1^\circ)90^\circ\}$.

The computation in 12 decimals, floating point, was carried out on the X1 computer of the Mathematical Centre.

This function is related to the Incomplete Elliptic Integrals of the first and second kind, resp. $F(k,\varphi)$ and $E(k,\varphi)$, by

$$(1) \qquad B(k,\varphi)= \frac{1}{k^2}\left[E(k,\varphi)-k'^2\, F(k,\varphi)\right] .$$

For $k > \frac{1}{2}\sqrt{2}$ this relation gives a method for computing $B(k,\varphi)$ from tables of F and E.
For $k \leq \frac{1}{2}\sqrt{2}$ however, this method fails, as the denominator and numerator of (1) become small, so that loss of significant figures will occur. In report TW 94 *) we therefore developed a method which can be used for calculating $B(k,\varphi)$ independent of F and E.
With this method the following table was obtained. Checking test-values for $k > \frac{1}{2}\sqrt{2}$ with values calculated from (1), we found an absolute error, not greater than 5 units in the 12th decimal.
So we have good reason to hope that the error of the 11th decimal, the last decimal of the following numbers, will be at most one unit.

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*) This report will be published in Numerische Mathematik.

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+ 2	+.017451521515	+.034892419581	+.052312083672	+.069699929083	+.087045409803
+ 3	+.017451522862	+.034892430353	+.052312119984	+.069700015008	+.087045577259
+ 4	+.017451524746	+.034892445416	+.052312170759	+.069700135158	+.087045811415
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+ 7	+.017451533593	+.034892516137	+.052312409156	+.069700699296	+.087046910859
+ 8	+.017451537594	+.034892548127	+.052312516992	+.069700954479	+.087047408191
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+45	+.10443289641	+.12171766247	+.13894681574	+.15611248508	+.17320682901

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+18	+.18975427575	+.20654534619	+.22321796669	+.23976283648	+.25617079064
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+45	+.27384065649	+.29021947717	+.30646578422	+.32257218468	+.33853135711

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+14	+.35097490003	+.36614322972	+.38110448924	+.39585116711	+.41037599717
+15	+.35103769360	+.36621471901	+.38118533695	+.39594203787	+.41047755442
+16	+.35110446970	+.36629074945	+.38127132859	+.39603869994	+.41058559519
+17	+.35117515922	+.36637124363	+.38136237815	+.39614105843	+.41070001549
+18	+.35124968873	+.36645611930	+.38145839420	+.39624901242	+.41082070466
+19	+.35132798056	+.36654528943	+.38155927993	+.39636245498	+.41094754540
+20	+.35140995279	+.36663866216	+.38166493314	+.39648127322	+.41108041379
+21	+.35149551933	+.36673614093	+.38177524631	+.39660534826	+.41121917928
+22	+.35158458995	+.36683762448	+.38189010666	+.39673455535	+.41136370478
+23	+.35167707033	+.36694300688	+.38200939612	+.39686876381	+.41151384663
+24	+.35177286211	+.36705217761	+.38213299145	+.39700783717	+.41166945465
+25	+.35187186294	+.36716502163	+.38226076426	+.39715163315	+.41183037221
+26	+.35197396654	+.36728141938	+.38239258106	+.39730000373	+.41199643624
+27	+.35207906279	+.36740124689	+.38252830336	+.39745279524	+.41216747731
+28	+.35218703774	+.36752437586	+.38266778769	+.39760984836	+.41234331967
+29	+.35229777375	+.36765067368	+.38281088571	+.39777099826	+.41252378131
+30	+.35241114953	+.36778000356	+.38295744426	+.39793607464	+.41270867407
+31	+.35252704023	+.36791222461	+.38310730548	+.39810490183	+.41289780369
+32	+.35264531753	+.36804719190	+.38326030689	+.39827729886	+.41309096989
+33	+.35276584973	+.36818475659	+.38341628147	+.39845307961	+.41328796653
+34	+.35288850185	+.36832476603	+.38357505782	+.39863205285	+.41348858165
+35	+.35301313576	+.36846706387	+.38373646022	+.39881402244	+.41369259761
+36	+.35313961024	+.36861149016	+.38390030878	+.39899878739	+.41389979124
+37	+.35326778116	+.36875788150	+.38406641959	+.39918614204	+.41410993398
+38	+.35339750155	+.36890607117	+.38423460484	+.39937587620	+.41432279201
+39	+.35352862176	+.36905588926	+.38440467296	+.39956777529	+.41453812643
+40	+.35366098960	+.36920716285	+.38457642881	+.39976162054	+.41475569343
+41	+.35379445046	+.36935971611	+.38474967385	+.39995718914	+.41497524451
+42	+.35392884747	+.36951337053	+.38492420629	+.40015425448	+.41519652664
+43	+.35406402169	+.36966794504	+.38509982130	+.40035258629	+.41541928251
+44	+.35419981221	+.36982325622	+.38527631120	+.40055195091	+.41564325076
+45	+.35433605638	+.36997911851	+.38545346570	+.40075211151	+.41586816621

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	+26	+27	+28	+29	+30
+ 1	+.42389951203	+.43787814231	+.45161037901	+.46509012356	+.47831158495
+ 2	+.42391157099	+.43789147249	+.45162504657	+.46510619300	+.47832911882
+ 3	+.42393165711	+.43791367636	+.45164947846	+.46513296045	+.47835832607
+ 4	+.42395975217	+.43794473426	+.45168365361	+.46517040343	+.47839918287
+ 5	+.42399583064	+.43798461868	+.45172754253	+.46521849049	+.47845165589
+ 6	+.42403985973	+.43803329423	+.45178110726	+.46527718117	+.47851570218
+ 7	+.42409179932	+.43809071764	+.45184430140	+.46534642598	+.47859126927
+ 8	+.42415160200	+.43815683776	+.45191707008	+.46542616638	+.47867829503
+ 9	+.42421921307	+.43823159555	+.45199934994	+.46551633476	+.47877670772
+10	+.42429457050	+.43831492404	+.45209106911	+.46561685443	+.47888642590
+11	+.42437760496	+.43840674837	+.45219214723	+.46572763956	+.47900735843
+12	+.42446823979	+.43850698574	+.45230249535	+.46584859518	+.47913940441
+13	+.42456639105	+.43861554542	+.45242201600	+.46597961711	+.47928245314
+14	+.42467196742	+.43873232872	+.45255060310	+.46612059199	+.47943638404
+15	+.42478487032	+.43885722899	+.45268814198	+.46627139716	+.47960106665
+16	+.42490499380	+.43899013161	+.45283450932	+.46643190069	+.47977636055
+17	+.42503222462	+.43913091399	+.45298957316	+.46660196131	+.47996211529
+18	+.42516644220	+.43927944554	+.45315319287	+.46678142839	+.48015817037
+19	+.42530751868	+.43943558768	+.45332521912	+.46697014189	+.48036435516
+20	+.42545531886	+.43959919385	+.45350549389	+.46716793232	+.48058048883
+21	+.42560970033	+.43977010948	+.45369385040	+.46737462074	+.48080638036
+22	+.42577051331	+.43994817200	+.45389011316	+.46759001869	+.48104182839
+23	+.42593760084	+.44013321089	+.45409409794	+.46781392820	+.48128662128
+24	+.42611079870	+.44032504763	+.45430561174	+.46804614173	+.48154053697
+25	+.42628993550	+.44052349576	+.45452445285	+.46828644217	+.48180334298
+26	+.42647483270	+.44072836089	+.45475041078	+.46853460284	+.48207479641
+27	+.42666530461	+.44093944074	+.45498326636	+.46879038748	+.48235464384
+28	+.42686115850	+.44115652516	+.45522279169	+.46905355022	+.48264262134
+29	+.42706219466	+.44137939620	+.45546875021	+.46932383565	+.48293845447
+30	+.42726820639	+.44160782814	+.45572089674	+.46960097878	+.48324185828
+31	+.42747898017	+.44184158757	+.45597897751	+.46988470512	+.48355253729
+32	+.42769429567	+.44208043347	+.45624273023	+.47017473068	+.48387018551
+33	+.42791392589	+.44232411727	+.45651188418	+.47047076208	+.48419448651
+34	+.42813763726	+.44257238299	+.45678616027	+.47077249656	+.48452511344
+35	+.42836518972	+.44282496731	+.45706527115	+.47107962211	+.48486172911
+36	+.42859633690	+.44308159970	+.45734892133	+.47139181755	+.48520398605
+37	+.42883082622	+.44334200258	+.45763680731	+.47170875265	+.48555152664
+38	+.42906839909	+.44360589148	+.45792861771	+.47203008828	+.48590398321
+39	+.42930879101	+.44387297514	+.45822403349	+.47235547656	+.48626097819
+40	+.42955173183	+.44414295580	+.45852272804	+.47268456103	+.48662212429
+41	+.42979694591	+.44441552932	+.45882436749	+.47301697686	+.48698702469
+42	+.43004415232	+.44469038545	+.45912861086	+.47335235108	+.48735527323
+43	+.43029306510	+.44496720802	+.45943511033	+.47369030282	+.48772645470
+44	+.43054339351	+.44524567526	+.45974351152	+.47403044359	+.48810014509
+45	+.43079484226	+.44552546005	+.46005345378	+.47437237759	+.48847591189

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	+31	+32	+33	+34	+35
+ 1	+.49126928680	+.50395807395	+.51637311886	+.52850992740	+.54036434437
+ 2	+.49128834534	+.50397871487	+.51639539698	+.52853389444	+.54039004869
+ 3	+.49132009285	+.50401309883	+.51643250884	+.52857382045	+.54043286950
+ 4	+.49136450420	+.50406119947	+.51648442690	+.52862967681	+.54049277719
+ 5	+.49142154420	+.50412297986	+.51655111258	+.52870142341	+.54056973027
+ 6	+.49149116757	+.50419839245	+.51663251622	+.52878900861	+.54066367532
+ 7	+.49157331890	+.50428737906	+.51672857702	+.52889236920	+.54077454688
+ 8	+.49166793262	+.50438987084	+.51683922303	+.52901143032	+.54090226747
+ 9	+.49177493299	+.50450578820	+.51696437102	+.52914610539	+.54104674742
+10	+.49189423399	+.50463504075	+.51710392647	+.52929629601	+.54120788479
+11	+.49202573933	+.50477752725	+.51725778347	+.52946189192	+.54138556528
+12	+.49216934236	+.50493313555	+.51742582462	+.52964277081	+.54157966210
+13	+.49232492601	+.50510174246	+.51760792095	+.52983879828	+.54179003581
+14	+.49249236274	+.50528321373	+.51780393182	+.53004982766	+.54201653419
+15	+.49267151447	+.50547740393	+.51801370477	+.53027569993	+.54225899208
+16	+.49286223249	+.50568415636	+.51823707547	+.53051624351	+.54251723121
+17	+.49306435739	+.50590330293	+.51847386754	+.53077127420	+.54279106003
+18	+.49327771902	+.50613466413	+.51872389247	+.53104059494	+.54308027350
+19	+.49350213635	+.50637804884	+.51898694944	+.53132399571	+.54338465294
+20	+.49373741744	+.50663325428	+.51926282523	+.53162125331	+.54370396577
+21	+.49398335933	+.50690006589	+.51955129407	+.53193213124	+.54403796536
+22	+.49423974801	+.50717825724	+.51985211749	+.53225637951	+.54438639078
+23	+.49450635829	+.50746758989	+.52016504420	+.53259373444	+.54474896659
+24	+.49478295374	+.50776781331	+.52048980991	+.53294391854	+.54512540264
+25	+.49506928666	+.50807866479	+.52082613728	+.53330664025	+.54551539385
+26	+.49536509796	+.50839986931	+.52117373570	+.53368159387	+.54591861994
+27	+.49567011717	+.50873113949	+.52153230120	+.53406845929	+.54633474529
+28	+.49598406232	+.50907217547	+.52190151634	+.53446690189	+.54676341867
+29	+.49630663993	+.50942266488	+.52228105006	+.53487657237	+.54720427304
+30	+.49663754499	+.50978228272	+.52267055762	+.53529710656	+.54765692538
+31	+.49697646093	+.51015069133	+.52306968047	+.53572812535	+.54812097647
+32	+.49732305960	+.51052754038	+.52347804616	+.53616923450	+.54859601069
+33	+.49767700128	+.51091246679	+.52389526834	+.53662002455	+.54908159590
+34	+.49803793473	+.51130509474	+.52432094661	+.53708007073	+.54957728327
+35	+.49840549719	+.51170503568	+.52475466658	+.53754893288	+.55008260714
+36	+.49877931445	+.51211188838	+.52519599980	+.53802615536	+.55059708491
+37	+.49915900094	+.51252523892	+.52564450380	+.53851126709	+.55112021698
+38	+.49954415984	+.51294466081	+.52609972213	+.53900378147	+.55165148665
+39	+.49993438318	+.51336971511	+.52656118438	+.53950319644	+.55219036015
+40	+.50032925197	+.51379995047	+.52702840636	+.54000899456	+.55273628658
+41	+.50072833646	+.51423490337	+.52750089015	+.54052064303	+.55328869802
+42	+.50113119627	+.51467409830	+.52797812430	+.54103759390	+.55384700957
+43	+.50153738064	+.51511704793	+.52845958403	+.54155928419	+.55441061952
+44	+.50194642875	+.51556325343	+.52894473146	+.54208513611	+.55497890947
+45	+.50235786996	+.51601220474	+.52943301593	+.54261455736	+.55555124464

'alpha, phi'

	+36	+37	+38	+39	+40
+ 1	+.55193255857	+.56321110744	+.57419688127	+.58488712702	+.59527945165
+ 2	+.55196004490	+.56324041670	+.57422805036	+.58492018864	+.59531443413
+ 3	+.55200583515	+.56328924467	+.57427997763	+.58497526978	+.59537271646
+ 4	+.55206989884	+.56335756010	+.57435263119	+.58505233806	+.59545426591
+ 5	+.55215219322	+.56344531917	+.57444596633	+.58515134808	+.59555903656
+ 6	+.55225266326	+.56355246547	+.57455992546	+.58527224132	+.59568696924
+ 7	+.55237124156	+.56367892985	+.57469443801	+.58541494604	+.59583799137
+ 8	+.55250784824	+.56382463038	+.57484942030	+.58557937719	+.59601201687
+ 9	+.55266239085	+.56398947220	+.57502477542	+.58576543621	+.59620894597
+10	+.5283476430	+.56417334740	+.57522039309	+.58597301092	+.59642866505
+11	+.55302485065	+.56437613488	+.57543614949	+.58620197527	+.59667104639
+12	+.55323251903	+.56459770014	+.57567190707	+.58645218919	+.59693594798
+13	+.55345762544	+.56483789518	+.57592751431	+.58672349830	+.59722321321
+14	+.55370001262	+.56509655820	+.57620280556	+.58701573370	+.59753267065
+15	+.55395950981	+.56537351347	+.57649760072	+.58732871167	+.59786413369
+16	+.55423593259	+.56566857107	+.57681170507	+.58766223339	+.59821740024
+17	+.55452908269	+.56598152663	+.57714490889	+.58801608463	+.59859225236
+18	+.55483874771	+.56631216111	+.57749698725	+.58839003540	+.59898845593
+19	+.55516470093	+.56666024051	+.57786769968	+.58878383962	+.59940576020
+20	+.55550670109	+.56702551559	+.57825678982	+.58919723473	+.59984389742
+21	+.55586449209	+.56740772159	+.57866398512	+.58962994134	+.60030258237
+22	+.55623780277	+.56780657794	+.57908899646	+.59008166281	+.60078151196
+23	+.55662634666	+.56822178791	+.57953151783	+.59055208482	+.60128036472
+24	+.55702982167	+.56865303836	+.57999122594	+.59104087501	+.60179880032
+25	+.55744790988	+.56909999936	+.58046777982	+.59154768245	+.60233645907
+26	+.55788027723	+.56956232389	+.58096082048	+.59207213727	+.60289296143
+27	+.55832657325	+.57003964753	+.58146997052	+.59261385018	+.60346790748
+28	+.55878643082	+.57053158809	+.58199483368	+.59317241202	+.60406087635
+29	+.55925946589	+.57103774534	+.58253499454	+.59374739325	+.60467142573
+30	+.55974527720	+.57155770064	+.58309001803	+.59433834356	+.60529909129
+31	+.56024344608	+.57209101664	+.58365944913	+.59494479134	+.60594338614
+32	+.56075353616	+.57263723701	+.58424281245	+.59556624327	+.60660380030
+33	+.56127509317	+.57319588607	+.58483961184	+.59620218382	+.60727980014
+34	+.56180764472	+.57376646859	+.58544933007	+.59685207485	+.60797082785
+35	+.56235070012	+.57434846946	+.58607142850	+.59751535517	+.60867630091
+36	+.56290375018	+.57494135349	+.58670534668	+.59819144009	+.60939561158
+37	+.56346626708	+.57554456518	+.58735050216	+.59887972110	+.61012812644
+38	+.56403770429	+.57615752854	+.58800629013	+.59957956545	+.61087318588
+39	+.56461749639	+.57677964691	+.58867208322	+.60029031587	+.61163010372
+40	+.56520505913	+.57741030286	+.58934723133	+.60101129022	+.61239816674
+41	+.56579978933	+.57804885811	+.59003106139	+.60174178129	+.61317663441
+42	+.56640106495	+.57869465348	+.59072287734	+.60248105657	+.61396473851
+43	+.56700824518	+.57934700894	+.59142196001	+.60322835811	+.61476168291
+44	+.56762067054	+.58000522364	+.59212756712	+.60398290243	+.61556664340
+45	+.56823766310	+.58066857606	+.59283893340	+.60474388050	+.61637876752

'alpha, phi'

	+41	+42	+43	+44	+45
+ 1	+.60537182509	+.61516258264	+.62465042708	+.63383443022	+.64271403403
+ 2	+.60540875224	+.61520147369	+.62469129654	+.63387728779	+.64275888462
+ 3	+.60547027558	+.61526627015	+.62475939040	+.63394869537	+.64283361417
+ 4	+.60555636214	+.61535693902	+.62485467577	+.63404862030	+.64293819045
+ 5	+.60566696572	+.61547343400	+.62497710649	+.63417701679	+.64307256825
+ 6	+.60580202674	+.61561569537	+.62512662301	+.63433382573	+.64323668918
+ 7	+.60596147211	+.61578364989	+.62530315224	+.63451897454	+.64343048156
+ 8	+.60614521511	+.61597721060	+.62550660739	+.63473237705	+.64365386019
+ 9	+.60635315521	+.61619627664	+.62573688778	+.63497393317	+.64390672613
+10	+.60658517784	+.61644073303	+.62599387853	+.63524352872	+.64418896639
+11	+.60684115417	+.61671045042	+.62627745035	+.63554103507	+.64450045365
+12	+.60712094087	+.61700528480	+.62658745923	+.63586630887	+.64484104589
+13	+.60742437980	+.61732507717	+.62692374604	+.63621919162	+.64521058600
+14	+.60775129770	+.61766965324	+.62728613625	+.63659950934	+.64560890134
+15	+.60810150586	+.61803882303	+.62767443945	+.63700707206	+.64603580331
+16	+.60847479978	+.61843238049	+.62808844896	+.63744167342	+.64649108680
+17	+.60887095873	+.61885010304	+.62852794133	+.63790309012	+.64697452969
+18	+.60928974537	+.61929175115	+.62899267589	+.63839108138	+.64748589221
+19	+.60973090532	+.61975706784	+.62948239415	+.63890538841	+.64802491638
+20	+.61019416667	+.62024577818	+.62999681933	+.63944573372	+.64859132531
+21	+.61067923952	+.62075758872	+.63053565567	+.64001182056	+.64918482253
+22	+.61118581545	+.62129218699	+.63109858791	+.64060333219	+.64980509121
+23	+.61171356702	+.62184924083	+.63168528054	+.64121993118	+.65045179344
+24	+.61226214721	+.62242839786	+.63229537722	+.64186125867	+.65112456937
+25	+.61283118885	+.62302928480	+.63292850000	+.64252693359	+.65182303642
+26	+.61342030404	+.62365150681	+.63358424863	+.64321655186	+.65254678831
+27	+.61402908356	+.62429464684	+.63426219979	+.64392968554	+.65329539424
+28	+.61465709626	+.62495826494	+.63496190632	+.64466588199	+.65406839784
+29	+.61530388842	+.62564189752	+.63568289643	+.64542466294	+.65486531627
+30	+.61596898312	+.62634505666	+.63642467287	+.64620552364	+.65568563915
+31	+.61665187965	+.62706722937	+.63718671210	+.64700793186	+.65652882754
+32	+.61735205281	+.62780787684	+.63796846346	+.64783132696	+.65739431287
+33	+.61806895229	+.62856643370	+.63876934830	+.64867511895	+.65828149585
+34	+.61880200205	+.62934230730	+.63958875912	+.64953868745	+.65918974535
+35	+.61955059966	+.63013487692	+.64042605874	+.65042138077	+.66011839730
+36	+.62031411574	+.63094349310	+.64128057939	+.65132251484	+.66106675353
+37	+.62109189330	+.63176747687	+.64215162191	+.65224137231	+.66203408066
+38	+.62188324718	+.63260611906	+.64303845489	+.65317720147	+.66301960894
+39	+.62268746352	+.63345867963	+.64394031383	+.65412921538	+.66402253112
+40	+.62350379924	+.63432438703	+.64485640042	+.65509659086	+.66504200135
+41	+.62433148155	+.63520243760	+.64578588170	+.65607846757	+.66607713411
+42	+.62516970752	+.63609199496	+.64672788942	+.65707394720	+.66712700308
+43	+.62601764374	+.63699218957	+.64768151934	+.65808209256	+.66819064021
+44	+.62687442598	+.63790211822	+.64864583064	+.65910192686	+.66926703469
+45	+.62773915896	+.63882084372	+.64961984538	+.66013243299	+.67035513210

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	+46	+47	+48	+49	+50
+ 1	+.65128905136	+.65955966613	+.66752643314	+.67519027740	+.68255249299
+ 2	+.65133589500	+.65960849801	+.66757724361	+.67524305204	+.68260721267
+ 3	+.65141394669	+.65968986392	+.66766190778	+.67533099052	+.68269839366
+ 4	+.65152317479	+.65980373297	+.66778039564	+.67545406387	+.68282600818
+ 5	+.65166353487	+.65995006175	+.66793266501	+.67561223137	+.68299001717
+ 6	+.65183496958	+.66012879420	+.66811866144	+.67580544042	+.68319037012
+ 7	+.65203740846	+.66033986145	+.66833831795	+.67603362628	+.68342700490
+ 8	+.65227076773	+.66058318155	+.66859155485	+.67629671190	+.68369984746
+ 9	+.65253495004	+.66085865924	+.66887827942	+.67659460757	+.68400881153
+10	+.65282984419	+.66116618561	+.66919838559	+.67692721060	+.68435379831
+11	+.65315532475	+.66150563777	+.66955175361	+.67729440494	+.68473469602
+12	+.65351125173	+.66187687842	+.66993824957	+.67769606073	+.68515137949
+13	+.65389747014	+.66227975548	+.67035772498	+.67813203382	+.68560370960
+14	+.65431380956	+.66271410151	+.67081001625	+.67860216525	+.68609153281
+15	+.65476008360	+.66317973327	+.67129494415	+.67910628066	+.68661468048
+16	+.65523608940	+.66367645109	+.67181231317	+.67964418966	+.68717296823
+17	+.65574160702	+.66420403829	+.67236191091	+.68021568513	+.68776619525
+18	+.65627639885	+.66476226049	+.67294350733	+.68082054251	+.68839414350
+19	+.65684020890	+.66535086491	+.67355685407	+.68145851898	+.68905657689
+20	+.65743276212	+.66596957961	+.67420168356	+.68212935264	+.68975324040
+21	+.65805376366	+.66661811269	+.67487770823	+.68283276158	+.69048385912
+22	+.65870289803	+.66729615147	+.67558461959	+.68356844294	+.69124813726
+23	+.65937982832	+.66800336151	+.67632208726	+.68433607192	+.69204575706
+24	+.66008419527	+.66873938575	+.67708975795	+.68513530063	+.69287637766
+25	+.66081561638	+.66950384348	+.67788725445	+.68596575704	+.69373963392
+26	+.66157368495	+.67029632930	+.67871417444	+.68682704374	+.69463513512
+27	+.66235796906	+.67111641202	+.67957008937	+.68771873671	+.69556246367
+28	+.66316801052	+.67196363356	+.68045454322	+.68864038398	+.69652117369
+29	+.66400332382	+.67283750776	+.68136705124	+.68959150430	+.69751078954
+30	+.66486339499	+.67373751914	+.68230709858	+.69057158569	+.69853080431
+31	+.66574768045	+.67466312164	+.68327413897	+.69158008394	+.69958067819
+32	+.66665560583	+.67561373734	+.68426759326	+.69261642106	+.70065983683
+33	+.66758656475	+.67658875510	+.68528684796	+.69367998372	+.70176766960
+34	+.66853991759	+.67758752918	+.68633125370	+.69477012153	+.70290352776
+35	+.66951499020	+.67860937781	+.68740012372	+.69588614539	+.70406672267
+36	+.67051107266	+.67965358183	+.68849273221	+.69702732569	+.70525652377
+37	+.67152741795	+.68071938313	+.68960831276	+.69819289053	+.70647215671
+38	+.67256324066	+.68180598327	+.69074605664	+.69938202387	+.70771280122
+39	+.67361771570	+.68291254193	+.69190511116	+.70059386367	+.70897758911
+40	+.67468997697	+.68403817544	+.69308457797	+.70182750000	+.71026560211
+41	+.67577911613	+.68518195533	+.69428351136	+.70308197306	+.71157586975
+42	+.67688418131	+.68634290682	+.69550091660	+.70435627134	+.71290736715
+43	+.67800417591	+.68752000741	+.69673574823	+.70564932965	+.71425901286
+44	+.67913805742	+.68871218548	+.69798690843	+.70696002722	+.71562966667
+45	+.68028473628	+.68991831892	+.69925324544	+.70828718581	+.71701812745

	+51	+52	+53	+54	+55
+ 1	+.68961474151	+.69637905007	+.70284780876	+.70902376785	+.71491003434
+ 2	+.68967138246	+.69643758402	+.70290820310	+.70908598573	+.71497403490
+ 3	+.68976576646	+.69653512400	+.70300884476	+.70918966775	+.71508068923
+ 4	+.68989786703	+.69667164499	+.70314971029	+.70933479213	+.71522997734
+ 5	+.69006764697	+.69684711178	+.70333076670	+.70952132823	+.71542187107
+ 6	+.69027505814	+.69706147885	+.70355197126	+.70974923633	+.71565633389
+ 7	+.69052004126	+.69731469008	+.70381327129	+.71001846743	+.71593332069
+ 8	+.69080252567	+.69760667853	+.70411460388	+.71032896297	+.71625277751
+ 9	+.69112242898	+.69793736609	+.70445589558	+.71068065445	+.71661464116
+10	+.69147965676	+.69830666313	+.70483706199	+.71107346313	+.71701883887
+11	+.69187410204	+.69871446804	+.70525800734	+.71150729950	+.71746528782
+12	+.69230564493	+.69916066679	+.70571862399	+.71198206283	+.71795389463
+13	+.69277415207	+.69964513237	+.70621879191	+.71249764061	+.71848455481
+14	+.69327947602	+.70016772421	+.70675837803	+.71305390790	+.71905715212
+15	+.69382145469	+.70072828753	+.70733723561	+.71365072669	+.71967155791
+16	+.69439991062	+.70132665262	+.70795520352	+.71428794514	+.72032763031
+17	+.69501465026	+.70196263410	+.70861210542	+.71496539678	+.72102521347
+18	+.69566546313	+.70263603008	+.70930774892	+.71568289963	+.72176413663
+19	+.69635212099	+.70334662124	+.71004192468	+.71644025526	+.72254421316
+20	+.69707437692	+.70409416991	+.71081440538	+.71723724775	+.72336523954
+21	+.69783196429	+.70487841901	+.71162494467	+.71807364265	+.72422699423
+22	+.69862459576	+.70569909098	+.71247327608	+.71894918575	+.72512923646
+23	+.69945196212	+.70655588658	+.71335911174	+.71986360187	+.72607170497
+24	+.70031373108	+.70744848368	+.71428214111	+.72081659351	+.72705411662
+25	+.70120954608	+.70837653590	+.71524202963	+.72180783943	+.72807616493
+26	+.70213902490	+.70933967127	+.71623841725	+.72283699314	+.72913751853
+27	+.70310175825	+.71033749069	+.71727091687	+.72390368129	+.73023781949
+28	+.70409730834	+.71136956640	+.71833911273	+.72500750198	+.73137668155
+29	+.70512520726	+.71243544035	+.71944255867	+.72614802296	+.73255368829
+30	+.70618495541	+.71353462246	+.72058077633	+.72732477971	+.73376839112
+31	+.70727601974	+.71466658880	+.72175325321	+.72853727345	+.73502030717
+32	+.70839783200	+.71583077969	+.72295944069	+.72978496904	+.73630891712
+33	+.70954978687	+.71702659774	+.72419875191	+.73106729271	+.73763366286
+34	+.71073123999	+.71825340572	+.72547055953	+.73238362978	+.73899394501
+35	+.71194150600	+.71951052447	+.72677419348	+.73373332217	+.74038912036
+36	+.71317985642	+.72079723057	+.72810893851	+.73511566583	+.74181849911
+37	+.71444551748	+.72211275408	+.72947403168	+.73652990811	+.74328134212
+38	+.71573766795	+.72345627606	+.73086865978	+.73797524490	+.74477685781
+39	+.71705543681	+.72482692614	+.73229195658	+.73945081776	+.74630419914
+40	+.71839790092	+.72622377989	+.73374300010	+.74095571089	+.74786246035
+41	+.71976408265	+.72764585623	+.73522080966	+.74248894801	+.74945067354
+42	+.72115294741	+.72909211474	+.73672434297	+.74404948911	+.75106780523
+43	+.72256340123	+.73056145286	+.73825249309	+.74563622713	+.75271275270
+44	+.72399428828	+.73205270319	+.73980408530	+.74724798456	+.75438434028
+45	+.72544438837	+.73356463062	+.74137787400	+.74888350993	+.75608131548

'alpha, phi'

	+56	+57	+58	+59	+60
+ 1	+.72051006825	+.72582767837	+.73086701766	+.73563257816	+.74012918552
+ 2	+.72057580679	+.72589510659	+.73093608388	+.73570322756	+.74020136045
+ 3	+.72068535901	+.72600747623	+.73105118484	+.73582096853	+.74032164534
+ 4	+.72083870676	+.72616477108	+.73121230634	+.73598578890	+.74049003012
+ 5	+.72103582449	+.72636696830	+.73141942832	+.73619767149	+.74070650050
+ 6	+.72127667903	+.72661403820	+.73167252471	+.73645659390	+.74097103783
+ 7	+.72156122937	+.72690594403	+.73197156314	+.73676252826	+.74128361883
+ 8	+.72188942635	+.72724264168	+.73231650470	+.73711544099	+.74164421535
+ 9	+.72226121238	+.72762407933	+.73270730357	+.73751529245	+.74205279400
+10	+.72267652098	+.72805019709	+.73314390667	+.73796203651	+.74250931579
+11	+.72313527636	+.72852092653	+.73362625316	+.73845562016	+.74301373567
+12	+.72363739290	+.72903619013	+.73415427394	+.73899598295	+.74356600201
+13	+.72418277460	+.72959590076	+.73472789110	+.73958305645	+.74416605606
+14	+.72477131443	+.73019996103	+.73534701725	+.74021676359	+.74481383134
+15	+.72540289361	+.73084826257	+.73601155484	+.74089701798	+.74550925285
+16	+.72607738090	+.73154068529	+.73672139539	+.74162372313	+.74625223644
+17	+.72679463173	+.73227709649	+.73747641862	+.74239677163	+.74704268785
+18	+.72755448730	+.73305735002	+.73827649157	+.74321604419	+.74788050186
+19	+.72835677363	+.73388128522	+.73912146759	+.74408140866	+.74876556132
+20	+.72920130044	+.73474872592	+.74001118525	+.74499271900	+.74969773598
+21	+.73008786010	+.73565947922	+.74094546719	+.74594981404	+.75067688142
+22	+.73101622632	+.73661333429	+.74192411887	+.74695251624	+.75170283775
+23	+.73198615291	+.73761006103	+.74294692723	+.74800063038	+.75277542824
+24	+.73299737232	+.73864940864	+.74401365920	+.74909394205	+.75389445787
+25	+.73404959418	+.73973110408	+.74512406021	+.75023221609	+.75505971177
+26	+.73514250369	+.74085485046	+.74627785250	+.75141519495	+.75627095350
+27	+.73627575991	+.74202032529	+.74747473333	+.75264259685	+.75752792326
+28	+.73744899394	+.74322717858	+.74871437309	+.75391411385	+.75883033594
+29	+.73866180698	+.74447503092	+.74999641331	+.75522940983	+.76017787904
+30	+.73991376834	+.74576347132	+.75132046445	+.75658811827	+.76157021042
+31	+.74120441318	+.74709205500	+.75268610363	+.75798983990	+.76300695595
+32	+.74253324031	+.74846030101	+.75409287219	+.75943414019	+.76448770695
+33	+.74389970966	+.74986768971	+.75554027306	+.76092054670	+.76601201744
+34	+.74530323978	+.75131366006	+.75702776802	+.76244854626	+.76757940129
+35	+.74674320512	+.75279760686	+.75855477480	+.76401758189	+.76918932910
+36	+.74821893315	+.75431887773	+.76012066392	+.76562704967	+.77084122491
+37	+.74972970137	+.75587676996	+.76172475545	+.76727629528	+.77253446268
+38	+.75127473416	+.75747052720	+.76336631552	+.76896461044	+.77426836258
+39	+.75285319950	+.75909933596	+.76504455270	+.77069122904	+.77604218706
+40	+.75446420545	+.76076232198	+.76675861406	+.77245532315	+.77785513657
+41	+.75610679659	+.76245854635	+.76850758120	+.77425599874	+.77970634521
+42	+.75777995025	+.76418700149	+.77029046593	+.77609229118	+.78159487593
+43	+.75948257257	+.76594660697	+.77210620579	+.77796316049	+.78351971562
+44	+.76121349448	+.76773620515	+.77395365942	+.77986748640	+.78547976982
+45	+.76297146746	+.76955455662	+.77583160164	+.78180406313	+.78747385724

'alpha, phi'

	+61	+62	+63	+64	+65
+ 1	+.74436199316	+.74833647596	+.75205842363	+.75553393359	+.75876940362
+ 2	+.74443563337	+.74841151894	+.75213480486	+.75561158691	+.75884826152
+ 3	+.74455836180	+.74853658670	+.75226210444	+.75574100803	+.75897969164
+ 4	+.74473017046	+.74871167337	+.75244031861	+.75592219524	+.75916369431
+ 5	+.74495104802	+.74893677057	+.75266944189	+.75615514600	+.75940026984
+ 6	+.74522097960	+.74921186720	+.75294946700	+.75643985676	+.75968941837
+ 7	+.74553994655	+.74953694928	+.75328038457	+.75677632274	+.76003113965
+ 8	+.74590792621	+.74991199964	+.75366218293	+.75716453772	+.76042543280
+ 9	+.74632489153	+.75033699760	+.75409484775	+.75760449367	+.76087229603
+10	+.74679081071	+.75081191861	+.75457836172	+.75809618045	+.76137172624
+11	+.74730564678	+.75133673381	+.75511270409	+.75863958536	+.76192371867
+12	+.74786935706	+.75191140952	+.75569785018	+.75923469266	+.76252826642
+13	+.74848189263	+.75253590673	+.75633377089	+.75988148310	+.76318535994
+14	+.74914319771	+.75321018046	+.75702043204	+.76057993327	+.76389498648
+15	+.74985320894	+.75393417908	+.75775779378	+.76133001500	+.76465712942
+16	+.75061185467	+.75470784358	+.75854580978	+.76213169461	+.76547176761
+17	+.75141905408	+.75553110673	+.75938442645	+.76298493215	+.76633887457
+18	+.75227471631	+.75640389222	+.76027358211	+.76388968051	+.76725841769
+19	+.75317873947	+.75732611365	+.76121320596	+.76484588451	+.76823035726
+20	+.75413100956	+.75829767348	+.76220321707	+.76585347983	+.76925464552
+21	+.75513139929	+.75931846189	+.76324352325	+.76691239197	+.77033122552
+22	+.75617976688	+.76038835555	+.76433401981	+.76802253496	+.77146002999
+23	+.75727595465	+.76150721621	+.76547458824	+.76918381012	+.77264098001
+24	+.75841978760	+.76267488935	+.76666509476	+.77039610458	+.77387398365
+25	+.75961107178	+.76389120251	+.76790538878	+.77165928980	+.77515893445
+26	+.76084959269	+.76515596368	+.76919530121	+.77297321990	+.77649570981
+27	+.76213511335	+.76646895943	+.77053464269	+.77433772986	+.77788416919
+28	+.76346737245	+.76782995299	+.77192320157	+.77575263361	+.77932415225
+29	+.76484608216	+.76923868214	+.77336074191	+.77721772191	+.78081547677
+30	+.76627092596	+.77069485694	+.77484700117	+.77873276019	+.78235793647
+31	+.76774155619	+.77219815733	+.77638168777	+.78029748606	+.78395129856
+32	+.76925759147	+.77374823052	+.77796447856	+.78191160676	+.78559530123
+33	+.77081861396	+.77534468821	+.77959501594	+.78357479634	+.78728965081
+34	+.77242416639	+.77698710359	+.78127290491	+.78528669266	+.78903401883
+35	+.77407374893	+.77867500817	+.78299770983	+.78704689416	+.79082803872
+36	+.77576681581	+.78040788834	+.78476895095	+.78885495638	+.79267130242
+37	+.77750277171	+.78218518170	+.78658610073	+.79071038823	+.79456335657
+38	+.77928096797	+.78400627319	+.78844857984	+.79261264794	+.79650369850
+39	+.78110069849	+.78587049087	+.79035575290	+.79456113882	+.79849177188
+40	+.78296119537	+.78777710146	+.79230692395	+.79655520457	+.80052696206
+41	+.78486162435	+.78972530562	+.79430133158	+.79859412433	+.80260859105
+42	+.78680107984	+.79171423286	+.79633814368	+.80067710739	+.80473591211
+43	+.78877857979	+.79374293612	+.79841645192	+.80280328748	+.80690810397
+44	+.79079306013	+.79581038611	+.80053526581	+.80497171664	+.80912426456
+45	+.79284336900	+.79791546515	+.80269350638	+.80718135877	+.81138340438

'alpha, phi'

	+66	+67	+68	+69	+70
+ 1	+.76177152402	+.76454726949	+.76710389060	+.76944890497	+.77159008814
+ 2	+.76185151799	+.76462833032	+.76718594875	+.76953189091	+.77167393266
+ 3	+.76198484288	+.76476343461	+.76732271649	+.76967020614	+.77181367997
+ 4	+.76217150101	+.76495258660	+.76751419993	+.76986385857	+.77200933972
+ 5	+.76241149550	+.76519579214	+.76776040752	+.77011285917	+.77226092523
+ 6	+.76270483008	+.76549305846	+.76806134990	+.77041722181	+.77256845347
+ 7	+.76305150894	+.76584439404	+.76841703967	+.77077696305	+.77293194479
+ 8	+.76345153644	+.76624980834	+.76882749121	+.77119210202	+.77335142278
+ 9	+.76390491685	+.76670931153	+.76929272041	+.77166266005	+.77382691401
+10	+.76441165400	+.76722291418	+.76981274434	+.77218866045	+.77435844773
+11	+.76497175091	+.76779062687	+.77038758089	+.77277012816	+.77494605556
+12	+.76558520932	+.76841245976	+.77101724837	+.77340708929	+.77558977107
+13	+.76625202923	+.76908842215	+.77170176505	+.77409957076	+.77628962941
+14	+.76697220831	+.76981852188	+.77244114865	+.77484759974	+.77704566682
+15	+.76774574131	+.77060276479	+.77323541574	+.77565120315	+.77785792007
+16	+.76857261939	+.77144115405	+.77408458114	+.77651040703	+.77872642590
+17	+.76945282934	+.77233368944	+.77498865720	+.77742523585	+.77965122041
+18	+.77038635281	+.77328036652	+.77594765306	+.77839571180	+.78063233828
+19	+.77137316537	+.77428117584	+.77696157379	+.77942185400	+.78166981206
+20	+.77241323556	+.77533610193	+.77803041947	+.78050367757	+.78276367128
+21	+.77350652382	+.77644512229	+.77915418424	+.78164119268	+.78391394155
+22	+.77465298136	+.77760820628	+.78033285514	+.78283440355	+.78512064354
+23	+.77585254888	+.77882531386	+.78156641100	+.78408330724	+.78638379188
+24	+.77710515519	+.78009639434	+.78285482109	+.78538789245	+.78770339394
+25	+.77841071579	+.78142138486	+.78419804380	+.78674813815	+.78907944856
+26	+.77976913126	+.78280020890	+.78559602503	+.78816401213	+.79051194464
+27	+.78118028549	+.78423277454	+.78704869665	+.78963546939	+.79200085954
+28	+.78264404386	+.78571897267	+.78855597464	+.79116245042	+.79354615750
+29	+.78416025121	+.78725867501	+.79011775721	+.79274487932	+.79514778772
+30	+.78572872965	+.78885173195	+.79173392268	+.79438266179	+.79680568248
+31	+.78734927619	+.79049797023	+.79340432723	+.79607568289	+.79851975495
+32	+.78902166023	+.79219719048	+.79512880246	+.79782380467	+.80028989688
+33	+.79074562078	+.79394916446	+.79690715269	+.79962686356	+.80211597606
+34	+.79252086348	+.79575363216	+.79873915213	+.80148466757	+.80399783362
+35	+.79434705744	+.79761029861	+.80062454174	+.80339699325	+.80593528101
+36	+.79622383174	+.79951883048	+.80256302586	+.80536358235	+.80792809680
+37	+.79815077168	+.80147885235	+.80455426854	+.80738413824	+.80997602314
+38	+.80012741481	+.80348994272	+.80659788961	+.80945832203	+.81207876199
+39	+.80215324655	+.80555162969	+.80869346037	+.81158574832	+.81423597092
+40	+.80422769548	+.80766338625	+.81084049895	+.81376598063	+.81644725866
+41	+.80635012832	+.80982462525	+.81303846527	+.81599852643	+.81871218014
+42	+.80851984449	+.81203469395	+.81528675562	+.81828283170	+.82103023121
+43	+.81073607019	+.81429286807	+.81758469673	+.82061827511	+.82340084285
+44	+.81299795215	+.81659834544	+.81993153938	+.82300416164	+.82582337482
+45	+.81530455074	+.81895023915	+.82232645152	+.82543971566	+.82829710885

'alpha, phi'

	+71	+72	+73	+74	+75
+ 1	+.77353546405	+.77529329529	+.77687207303	+.77828050666	+.77952751320
+ 2	+.77362009861	+.77537865237	+.77695808644	+.77836711187	+.77961464766
+ 3	+.77376116373	+.77552092269	+.77710145157	+.77851146420	+.77975988285
+ 4	+.77395867065	+.77572011899	+.77730218257	+.77871357908	+.77996323538
+ 5	+.77421263498	+.77597625900	+.77756029912	+.77897347799	+.78022472838
+ 6	+.77452307655	+.77628936528	+.77787582633	+.77929118837	+.78054439142
+ 7	+.77489001932	+.77665946513	+.77824879459	+.77966674350	+.78092226037
+ 8	+.77531349111	+.77708659035	+.77867923941	+.78010018228	+.78135837727
+ 9	+.77579352342	+.77757077706	+.77916720120	+.78059154908	+.78185279008
+10	+.77633015111	+.77811206539	+.77971272500	+.78114089345	+.78240555248
+11	+.77692341213	+.77871049922	+.78031586021	+.78174826990	+.78301672364
+12	+.77757334712	+.77936612582	+.78097666026	+.78241373754	+.78368636786
+13	+.77827999902	+.78007899546	+.78169518225	+.78313735977	+.78441455428
+14	+.77904341262	+.78084916098	+.78247148651	+.78391920382	+.78520135648
+15	+.77986363406	+.78167667730	+.78330563615	+.78475934040	+.78604685207
+16	+.78074071025	+.78256160090	+.78419769659	+.78565784314	+.78695112222
+17	+.78167468828	+.78350398921	+.78514773491	+.78661478808	+.78791425116
+18	+.78266561470	+.78450390000	+.78615581931	+.78763025307	+.78893632560
+19	+.78371353485	+.78556139060	+.78722201840	+.78870431714	+.79001743409
+20	+.78481849195	+.78667651722	+.78834640045	+.78983705977	+.79115766640
+21	+.78598052631	+.78784933398	+.78952903259	+.79102856009	+.79235711270
+22	+.78719967428	+.78907989208	+.79076997988	+.79227889609	+.79361586281
+23	+.78847596722	+.79036823873	+.79206930440	+.79358814360	+.79493400526
+24	+.78980943038	+.79171441607	+.79342706414	+.79495637539	+.79631162635
+25	+.79120008159	+.79311845994	+.79484331187	+.79638365994	+.79774880908
+26	+.79264792993	+.79458039859	+.79631809386	+.79787006034	+.79924563200
+27	+.79415297424	+.79610025125	+.79785144853	+.79941563290	+.80080216796
+28	+.79571520150	+.79767802657	+.79944340498	+.80102042579	+.80241848272
+29	+.79733458509	+.79931372095	+.80109398132	+.80268447741	+.80409463349
+30	+.79901108287	+.80100731666	+.80280318292	+.80440781478	+.80583066727
+31	+.80074463512	+.80275877992	+.80457100053	+.80619045161	+.80762661911
+32	+.80253516230	+.80456805864	+.80639740813	+.80803238637	+.80948251017
+33	+.80438256257	+.80643508014	+.80828236070	+.80993360004	+.81139834564
+34	+.80628670917	+.80835974852	+.81022579172	+.81189405376	+.81337411241
+35	+.80824744752	+.81034194188	+.81222761047	+.81391368622	+.81540977662
+36	+.81026459204	+.81238150930	+.81428769911	+.81599241086	+.81750528090
+37	+.81233792281	+.81447826750	+.81640590945	+.81813011273	+.81966054145
+38	+.81446718177	+.81663199722	+.81858205949	+.82032664516	+.82187544473
+39	+.81665206873	+.81884243933	+.82081592957	+.82258182606	+.82414984398
+40	+.81889223694	+.82110929050	+.82310725823	+.82489543393	+.82648355533
+41	+.82118728828	+.82343219852	+.82545573770	+.82726720343	+.82887635355
+42	+.82353676808	+.82581075724	+.82786100889	+.82969682062	+.83132796743
+43	+.82594015936	+.82824450097	+.83032265601	+.83218391769	+.83383807472
+44	+.82839687669	+.83073289840	+.83284020062	+.83472806721	+.83640629657
+45	+.83090625936	+.83327534598	+.83541309517	+.83732877583	+.83903219142

'alpha, phi'

	+76	+77	+78	+79	+80
+ 1	+.78062220642	+.78157388570	+.78239202479	+.78308626016	+.78366637930
+ 2	+.78070980985	+.78166190041	+.78248039592	+.78317493599	+.78375531149
+ 3	+.78085582737	+.78180860402	+.78262769413	+.78332274251	+.78390354567
+ 4	+.78106027664	+.78201401513	+.78283393884	+.78352969987	+.78411110262
+ 5	+.78132318228	+.78227815969	+.78309915717	+.78379583620	+.78437801131
+ 6	+.78164457578	+.78260107091	+.78342338383	+.78412118751	+.78470430889
+ 7	+.78202449539	+.78298278912	+.78380666102	+.78450579761	+.78509004053
+ 8	+.78246298592	+.78342336167	+.78424903827	+.78494971794	+.78553525928
+ 9	+.78296009860	+.78392284267	+.78475057227	+.78545300741	+.78604002598
+10	+.78351589086	+.78448129289	+.78531132670	+.78601573224	+.78660440899
+11	+.78413042604	+.78509877941	+.78593137197	+.78663796571	+.78722848403
+12	+.78480377314	+.78577537544	+.78661078496	+.78731978791	+.78791233395
+13	+.78553600652	+.78651115995	+.78734964875	+.78806128546	+.78865604838
+14	+.78632720545	+.78730621736	+.78814805225	+.78886255119	+.78945972351
+15	+.78717745383	+.78816063713	+.78900608987	+.78972368382	+.79032346170
+16	+.78808683965	+.78907451338	+.78992386111	+.79064478750	+.79124737111
+17	+.78905545453	+.79004794436	+.79090147007	+.79162597143	+.79223156529
+18	+.79008339320	+.79108103196	+.79193902498	+.79266734936	+.79327616269
+19	+.79117075289	+.79217388117	+.79303663768	+.79376903907	+.79438128619
+20	+.79231763266	+.79332659939	+.79419442296	+.79493116179	+.79554706254
+21	+.79352413272	+.79453929583	+.79541249796	+.79615384159	+.79677362169
+22	+.79479035362	+.79581208069	+.79669098143	+.79743720466	+.79806109623
+23	+.79611639544	+.79714506438	+.79802999295	+.79878137855	+.79940962057
+24	+.79750235680	+.79853835662	+.79942965206	+.80018649140	+.80081933018
+25	+.79894833391	+.79999206549	+.80089007736	+.80165267100	+.80229036073
+26	+.80045441942	+.80150629633	+.80241138547	+.80318004381	+.80382284715
+27	+.80202070125	+.80308115063	+.80399368993	+.80476873392	+.80541692257
+28	+.80364726124	+.80471672474	+.80563709999	+.80641886186	+.80707271724
+29	+.80533417377	+.80641310853	+.80734171931	+.80813054337	+.80879035727
+30	+.80708150415	+.80817038386	+.80910764450	+.80990388799	+.81056996334
+31	+.80888930697	+.80998862300	+.81093496357	+.81173899756	+.81241164921
+32	+.81075762424	+.81186788681	+.81282375425	+.81363596461	+.81431552018
+33	+.81268648334	+.81380822285	+.81477408210	+.81559487054	+.81628167131
+34	+.81467589489	+.81580966325	+.81678599852	+.81761578372	+.81831018564
+35	+.81672585030	+.81787222241	+.81885953851	+.81969875730	+.82040113204
+36	+.81883631918	+.81999589451	+.82099471829	+.82184382698	+.82255456306
+37	+.82100724650	+.82218065076	+.82319153267	+.82405100841	+.82477051245
+38	+.82323854943	+.82442643641	+.82544995218	+.82632029448	+.82704899252
+39	+.82553011401	+.82673316750	+.82776991989	+.82865165228	+.82938999122
+40	+.82788179134	+.82910072726	+.83015134807	+.83104501981	+.83179346900
+41	+.83029339360	+.83152896221	+.83259411433	+.83350030237	+.8342593531
+42	+.83276468952	+.83401767790	+.83509805759	+.83601736863	+.83678754480
+43	+.83529539955	+.83656663418	+.83766297353	+.83859604626	+.83937789317
+44	+.83788519044	+.83917554006	+.84028860966	+.84123611722	+.84203021261
+45	+.84053366946	+.84184404811	+.84297465990	+.84393731255	+.84474426677

'alpha, phi'

	+81	+82	+83	+84	+85
+ 1	+.78414230883	+.78452410232	+.78482192811	+.78504605687	+.78520684910
+ 2	+.78423145263	+.78461341681	+.78491137641	+.78513560630	+.78529647136
+ 3	+.78438003983	+.78476228880	+.78506047163	+.78528487024	+.78544585679
+ 4	+.78458809173	+.78497073996	+.78526923579	+.78549387097	+.78565502785
+ 5	+.78485563802	+.78523880060	+.78553769965	+.78576263958	+.78592401591
+ 6	+.78518271678	+.78556650954	+.78586590263	+.78609121597	+.78625286118
+ 7	+.78556937431	+.78595391402	+.78625389271	+.78647964867	+.78664161261
+ 8	+.78601566504	+.78640106959	+.78670172631	+.78692799477	+.78709032777
+ 9	+.78652165137	+.78690803992	+.78720946813	+.78743631975	+.78759907271
+10	+.78708740349	+.78747489669	+.78777719101	+.78800469734	+.78816792179
+11	+.78771299916	+.78810171932	+.78840497570	+.78863320930	+.78879695751
+12	+.78839852350	+.78878859479	+.78909291065	+.78932194519	+.78948627025
+13	+.78914406870	+.78953561736	+.78984109176	+.79007100218	+.79023595808
+14	+.78994973372	+.79034288829	+.79064962209	+.79088048468	+.79104612641
+15	+.79081562400	+.79121051549	+.79151861154	+.79175050413	+.79191688777
+16	+.79174185104	+.79213861321	+.79244817650	+.79268117856	+.79284836140
+17	+.79272853201	+.79312730159	+.79343843950	+.79367263228	+.79384067291
+18	+.79377578933	+.79417670627	+.79448952871	+.79472499542	+.79489395385
+19	+.79488375015	+.79528695787	+.79560157753	+.79583840351	+.79600834126
+20	+.79605254579	+.79645819152	+.79677472406	+.79701299691	+.79718397719
+21	+.79728231122	+.79769054620	+.79800911053	+.79824892032	+.79842100811
+22	+.79857318433	+.79898416422	+.79930488269	+.79954632215	+.79971958436
+23	+.79992530529	+.80033919042	+.80066218914	+.80090535385	+.80107985947
+24	+.80133881575	+.80175577152	+.80208118061	+.80232616920	+.80250198947
+25	+.80281385800	+.80323405523	+.80356200913	+.80380892355	+.80398613208
+26	+.80435057407	+.80477418941	+.80510482716	+.80535377292	+.80553244590
+27	+.80594910471	+.80637632106	+.80670978670	+.80696087309	+.80714108950
+28	+.80760958833	+.80804059528	+.80837703819	+.80863037859	+.80881222039
+29	+.80933215980	+.80976715414	+.81010672941	+.81036244159	+.81054599391
+30	+.81111694917	+.81155613539	+.81189900425	+.81215721070	+.81234256214
+31	+.81296408026	+.81340767112	+.81375400141	+.81401482966	+.81420207248
+32	+.81487366913	+.81532188627	+.81567185289	+.81593543594	+.81612466637
+33	+.81684582244	+.81729889701	+.81765268248	+.81791915913	+.81811047768
+34	+.81888063558	+.81933880896	+.81969660397	+.81996611932	+.82015963108
+35	+.82097819076	+.82144171531	+.82180371933	+.82207642523	+.82227224022
+36	+.82313855481	+.82360769468	+.82397411662	+.82425017220	+.82444840577
+37	+.82536177682	+.82583680887	+.82620786783	+.82648744005	+.82668821328
+38	+.82764788561	+.82812910036	+.82850502637	+.82878829065	+.82899173081
+39	+.82999688690	+.83048458957	+.83086562449	+.83115276536	+.83135900641
+40	+.83240876023	+.83290327192	+.83328967037	+.83358088220	+.83379006531
+41	+.83488345567	+.83538511458	+.83577714493	+.83607263274	+.83628490692
+42	+.83742089007	+.83793005288	+.83832799841	+.83862797877	+.83884350148
+43	+.84002094311	+.84053798650	+.84094214660	+.84124684855	+.84146578645
+44	+.84268345290	+.84320877516	+.84361946669	+.84392913285	+.84415166259
+45	+.84540821111	+.84594223397	+.84635979277	+.84667468045	+.84690098956

'alpha, phi'

	+86	+87	+88	+89	+90
+ 1	+.78531474251	+.78538023929	+.78541389328	+.78542629717	+.78542806952
+ 2	+.78540441378	+.78546994038	+.78550360973	+.78551601928	+.78551779245
+ 3	+.78555388098	+.78561945734	+.78565315231	+.78566557131	+.78566734583
+ 4	+.78576316670	+.78582881283	+.78586254371	+.78587497597	+.78587675238
+ 5	+.78603230246	+.78609803848	+.78613181563	+.78614426496	+.78614604382
+ 6	+.78636132872	+.78642717488	+.78646100872	+.78647347898	+.78647526082
+ 7	+.78675029469	+.78681627140	+.78685017246	+.78686266752	+.78686445291
+ 8	+.78719925827	+.78726538617	+.78729936505	+.78731188883	+.78731367833
+ 9	+.78770828589	+.78777458583	+.78780865328	+.78782120974	+.78782300391
+10	+.78827745236	+.78834394545	+.78837811234	+.78839070551	+.78839250492
+11	+.78890684066	+.78897354834	+.78900782570	+.78902045963	+.78902226488
+12	+.78959654173	+.78966348576	+.78969788479	+.78971056363	+.78971237530
+13	+.79034665424	+.79041385675	+.79044838887	+.79046111682	+.79046293550
+14	+.79115728430	+.79122476785	+.79125944465	+.79127222600	+.79127405233
+15	+.79202854517	+.79209633276	+.79213116610	+.79214400522	+.79214583981
+16	+.79296055690	+.79302867203	+.79306367402	+.79307657538	+.79307841887
+17	+.79395344598	+.79402191270	+.79405709572	+.79407006390	+.79407191694
+18	+.79500734493	+.79507618787	+.79511156461	+.79512460428	+.79512646755
+19	+.79612239183	+.79619163625	+.79622721973	+.79624033571	+.79624220988
+20	+.79729872985	+.79736840171	+.79740420529	+.79741740251	+.79741928830
+21	+.79853650667	+.79860663266	+.79864267011	+.79865595366	+.79865785179
+22	+.79983587394	+.79990648157	+.79994276705	+.79995614215	+.79995805338
+23	+.80119698660	+.80126810423	+.80130465236	+.80131812442	+.80132004951
+24	+.80262000219	+.80269165910	+.80272848498	+.80274205957	+.80274399932
+25	+.80410508006	+.80417730655	+.80421442579	+.80422810868	+.80423006392
+26	+.80565238058	+.80572520800	+.80576263678	+.80577643394	+.80577840552
+27	+.80726206419	+.80733552505	+.80737328013	+.80738719776	+.80738918657
+28	+.80893429040	+.80900841847	+.80904651726	+.80906056179	+.80906256875
+29	+.81066921676	+.81074404713	+.81078250773	+.81079668584	+.81079871191
+30	+.81246699766	+.81254256684	+.81258140809	+.81259572675	+.81259777292
+31	+.81432778303	+.81440412908	+.81444337063	+.81445783710	+.81445990440
+32	+.81625171699	+.81632887964	+.81636854197	+.81638316383	+.81638525336
+33	+.81823893632	+.81831695707	+.81835706161	+.81837184677	+.81837395966
+34	+.82028956882	+.82036849108	+.82040906025	+.82042401701	+.82042615444
+35	+.82240373150	+.82248360077	+.82252465806	+.82253979510	+.82254195832
+36	+.82458152867	+.82466239267	+.82470396273	+.82471928917	+.82472147948
+37	+.82682304977	+.82690495863	+.82694706735	+.82696259277	+.82696481155
+38	+.82912836711	+.82921137355	+.82925404819	+.82926978267	+.82927203135
+39	+.83149753328	+.83158169286	+.83162496211	+.83164091627	+.83164319638
+40	+.83393057847	+.83401594976	+.83405984392	+.83407602898	+.83407834212
+41	+.83642750743	+.83651415231	+.83655870339	+.83657513118	+.83657747905
+42	+.83898829621	+.83907628015	+.83912152200	+.83913820507	+.83914058947
+43	+.84161288857	+.84170228091	+.84174824943	+.84176520106	+.84176762389
+44	+.84430119210	+.84439206642	+.84443879969	+.84445603400	+.84445849728
+45	+.84705307392	+.84714550841	+.84719304693	+.84721057892	+.84721308479