

Spreadsheet Formulas for the Wilcoxon Rank Sum Test and Power Calculation

Wilcoxon Rank Sum Test, per NUREG-1505

LBGR 2.1 (For this calculation, LBGR = 3w for Building 722 Background)
(Reference Dataset - Building 722 Alpha Phoswich)

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY AREA RANKS
1	R	1	38.5	0
3	R	3	70.5	0
3	R	3	70.5	0
1	R	1	38.5	0
4	R	4	90.5	0
4	R	4	90.5	0
4	R	4	90.5	0
1	R	1	38.5	0
4	R	4	90.5	0
4	R	4	90.5	0
9	R	9	127.5	0
7	R	7	122	0
2	R	2	51	0
2	R	2	51	0
4	R	4	90.5	0
3	R	3	70.5	0
1	R	1	38.5	0
6	R	6	113	0
3	R	3	70.5	0
3	R	3	70.5	0
2	R	2	51	0
1	R	1	38.5	0
2	R	2	51	0
4	R	4	90.5	0
4	R	4	90.5	0
7	R	7	122	0
3	R	3	70.5	0
3	R	3	70.5	0
5	R	5	103.5	0
2	R	2	51	0
2	R	2	51	0
4	R	4	90.5	0
4	R	4	90.5	0
3	R	3	70.5	0
6	R	6	113	0
0	R	0	26.5	0
6	R	6	113	0
2	R	2	51	0
3	R	3	70.5	0
4	R	4	90.5	0
5	R	5	103.5	0
7	R	7	122	0
4	R	4	90.5	0
9	R	9	127.5	0
5	R	5	103.5	0
0	R	0	26.5	0
3	R	3	70.5	0
7	R	7	122	0
6	R	6	113	0
3	R	3	70.5	0
3	R	3	70.5	0
4	R	4	90.5	0
5	R	5	103.5	0
6	R	6	113	0
14	R	14	130	0
2	R	2	51	0
6	R	6	113	0
6	R	6	113	0
7	R	7	122	0
4	R	4	90.5	0
0	R	0	26.5	0
4	R	4	90.5	0
2	R	2	51	0
3	R	3	70.5	0
4	R	4	90.5	0
5	R	5	103.5	0
5	R	5	103.5	0
3	R	3	70.5	0
6	R	6	113	0
7	R	7	122	0
1	R	1	38.5	0
1	R	1	38.5	0
5	R	5	103.5	0
6	R	6	113	0
2	R	2	51	0
4	R	4	90.5	0
2	R	2	51	0

Count	30	m
SD	1.0	
Median	1	
Reference Stats		
Count	100	n
SD	2.3	
Median	3	
Critical Value	2319.7	

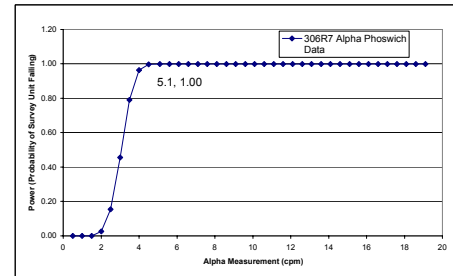
Bkgd Median plus LBGR 5.1

Retrospective Power Curve Calculation

From Example in Section 10.5 of NUREG-1505

p1 and p2 pull data from Table 10-3 sheet

C	Measurement	(C-LBGR)/SD	Rounded	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power
0.5	-0.685	-0.700	0.310309	0.164691	930.927	27728.18	166.5178	5.544592	0.00	0.00
1	-0.471	-0.500	0.361837	0.206286	1085.511	30527.37	174.7208	4.39953	0.00	0.00
1.5	-0.2567	-0.300	0.416002	0.253419	1248.006	32551.92	180.4215	3.359879	0.00	0.00
2	-0.0428	0.000	0.5	0.333333	1500	33749.87	183.7114	1.928027	0.03	0.03
2.5	0.1712	0.200	0.556231	0.391392	1668.693	33212.15	182.242	1.017918	0.15	0.15
3	0.3851	0.400	0.611351	0.451875	1834.053	31650.28	177.9053	0.113248	0.45	0.45
3.5	0.5990	0.600	0.664313	0.513387	1992.939	29210.8	170.9117	-0.81176	0.79	0.79
4	0.8130	0.800	0.714196	0.574469	2142.588	26112.02	161.5921	-1.78466	0.96	0.96
4.5	1.0269	1.000	0.76025	0.633702	2280.75	22612.7	150.3752	-2.83657	1.00	1.00
5.1	1.2836	1.300	0.821015	0.716331	2463.048	17177.93	131.0646	-4.64538	1.00	1.00
5.6	1.4976	1.500	0.838901	0.741698	2516.703	15430.91	124.2212	-5.33325	1	1
6.1	1.7115	1.700	0.87105	0.788602	2613.15	12167.03	110.3043	-6.88051	1	1
6.6	1.9254	1.900	0.898454	0.830022	2695.362	9303.458	96.45443	-8.72082	1	1
7.1	2.1394	2.100	0.92135	0.865767	2764.05	6902.339	83.08032	-10.9514	1	1
7.6	2.3533	2.400	0.945062	0.908982	2844.186	4171.257	64.58527	-15.3253	1	1
8.1	2.5673	2.600	0.96145	0.931365	2894.35	2874.835	53.61749	-19.2129	1	1
8.6	2.7812	2.800	0.971881	0.949208	2915.643	1925.492	43.88043	-24.1894	1	1
9.1	2.9951	3.000	0.979848	0.963118	2939.544	1253.533	35.40527	-30.6549	1	1
9.6	3.2091	3.200	0.985811	0.973725	2957.433	795.0252	28.19619	-39.127	1	1
10.1	3.4230	3.400	0.990188	0.981636	2970.564	489.9821	22.13554	-50.4331	1	1
10.6	3.6370	3.600	0.993336	0.98741	2980.008	294.5209	17.16161	-65.6003	1	1
11.1	3.8509	3.900	0.993336	0.98741	2980.008	294.5209	17.16161	-65.6003	1	1
11.6	4.0648	4.100	0.997661	0.995497	2992.983	74.1341	8.610116	-132.261	1	1
12.1	4.2788	4.300	0.997661	0.995497	2992.983	74.1341	8.610116	-132.261	1	1
12.6	4.4927	4.500	0.997661	0.995497	2992.983	74.1341	8.610116	-132.261	1	1
13.1	4.7067	4.700	0.997661	0.995497	2992.983	74.1341	8.610116	-132.261	1	1
13.6	4.9206	4.900	0.997661	0.995497	2992.983	74.1341	8.610116	-132.261	1	1
14.1	5.1345	5.100	0.999796	0.999599	2999.388	3.367395	1.835046	-624.065	1	1
14.6	5.3485	5.300	0.999796	0.999599	2999.388	3.367395	1.835046	-624.065	1	1
15.1	5.5624	5.600	0.999796	0.999599	2999.388	3.367395	1.835046	-624.065	1	1
15.6	5.7763	5.800	0.999796	0.999599	2999.388	3.367395	1.835046	-624.065	1	1
16.1	5.9903	6.000	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
16.6	6.2042	6.200	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
17.1	6.4182	6.400	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
17.6	6.6321	6.600	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
18.1	6.8460	6.800	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
18.6	7.0600	7.100	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1
19.1	7.2739	7.300	0.999989	0.999978	2999.967	0.032952	0.181526	-6311.86	1	1



Based on the number of measurements and the observed standard deviation, a survey unit with a median measurement equal to the background median plus the LBGR (5.1) will have a 1.0 probability that the survey unit will correctly fail (i.e., the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR [i.e., the survey unit is indistinguishable from background] is rejected).

1	R	1	38.5	0
6	R	6	113	0
4	R	4	90.5	0
2	R	2	51	0
2	R	2	51	0
3	R	3	70.5	0
3	R	3	70.5	0
3	S	0.9	31.5	31.5
1	S	-1.1	12	12
0	S	-2.1	3.5	3.5
2	S	-0.1	21	21
1	S	-1.1	12	12
1	S	-1.1	12	12
0	S	-2.1	3.5	3.5
0	S	-2.1	3.5	3.5
0	S	-2.1	3.5	3.5
2	S	-0.1	21	21
0	S	-2.1	3.5	3.5
3	S	0.9	31.5	31.5
1	S	-1.1	12	12
1	S	-1.1	12	12
2	S	-0.1	21	21
3	S	0.9	31.5	31.5
1	S	-1.1	12	12
1	S	-1.1	12	12
2	S	-0.1	21	21
1	S	-1.1	12	12
3	S	0.9	31.5	31.5
2	S	-0.1	21	21
3	S	0.9	31.5	31.5
1	S	-1.1	12	12
1	S	-1.1	12	12
1	S	-1.1	12	12
0	S	-2.1	3.5	3.5
3	S	0.9	31.5	31.5
2	S	-0.1	21	21
2	S	-0.1	21	21
2	S	-0.1	21	21
Sum =		8515	489	

* This spreadsheet is originally designed to work with a set of twenty measurements, 10 from the survey unit (S) and 10 from the background reference area (R). If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

of R: 100 *n*
of S: 30 *m*
Avg Rank R: 80
Avg Rank S: 16

For *m* or *n* greater than 20, the critical value (*k*) can be calculated for Scenario B from

$$\frac{m(n+m+1)}{2} + z_c \sqrt{\frac{nm(n+m+1)}{12}}$$

z = 97.5% percentile of standard normal distribution = 1.960

$$k = 2319.7$$

Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR (i.e., the survey unit is indistinguishable from background) is accepted and the survey unit passes Scenario B

Spreadsheet Formulas for the Wilcoxon Rank Sum Test and Power Calculation

Wilcoxon Rank Sum Test, per NUREG-1506

LBGR 417.60 (For this calculation, LBGR = 3σ for Building 722 Background)

(Reference Dataset - Building 722 Beta Phoswich)

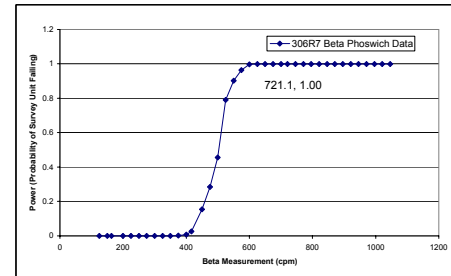
DATA	AREA	ADJUSTED DATA	RANKS	SURVEY AREA RANKS
211 R		211	44	0
358 R		358	90	0
278 R		278	73	0
275 R		275	71	0
234 R		234	55	0
209 R		209	43	0
429 R		429	102	0
327 R		327	84.5	0
237 R		237	57	0
258 R		258	63	0
370 R		370	92	0
497 R		497	112	0
448 R		448	105	0
401 R		401	95	0
423 R		423	101	0
368 R		368	91	0
432 R		432	103	0
485 R		485	110	0
418 R		418	99	0
337 R		337	87	0
498 R		498	113.5	0
496 R		496	111	0
617 R		617	124	0
511 R		511	117.5	0
463 R		463	107	0
480 R		480	108	0
411 R		411	97	0
457 R		457	106	0
437 R		437	104	0
484 R		484	109	0
541 R		541	122	0
498 R		498	113.5	0
529 R		529	119	0
511 R		511	117.5	0
405 R		405	96	0
537 R		537	121	0
420 R		420	100	0
207 R		207	78	0
533 R		533	120	0
501 R		501	116	0
239 R		239	59	0
327 R		327	84.5	0
342 R		342	88	0
271 R		271	68.5	0
274 R		274	70	0
371 R		371	93	0
376 R		376	94	0
238 R		238	58	0
243 R		243	60	0
281 R		281	75.5	0
295 R		295	77	0
316 R		316	82	0
271 R		271	68.5	0
306 R		306	81	0
597 R		597	123	0
717 R		717	125	0
225 R		225	50	0
276 R		276	72	0
301 R		301	80	0
500 R		500	115	0
232 R		232	54	0
201 R		201	39.5	0
183 R		183	36	0
250 R		250	62	0
223 R		223	48.5	0
201 R		201	39.5	0
205 R		205	41	0
280 R		280	74	0
270 R		270	67	0
319 R		319	83	0
328 R		328	86	0
923 R		923	127	0
281 R		281	75.5	0
285 R		285	64	0
1187 R		1187	130	0
779 R		779	126	0
1026 R		1026	129	0
935 R		935	128	0
353 R		353	89	0
412 R		412	98	0
160 R		160	31	0
170 R		170	33	0
173 R		173	35	0
236 R		236	56	0
221 R		221	46.5	0
219 R		219	45	0
194 R		194	38	0
162 R		162	32	0
245 R		245	61	0
172 R		172	34	0
226 R		226	51.5	0
223 R		223	48.5	0
266 R		266	65	0

Retrospective Power Curve Calculation

From Example in Section 10.5 of NUREG-1505

p1 and p2 pull data from Table 10-3 sheet

C	Measurement (C-LBGR)/SD	Rounded	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power
Count	125	-1.570	-1.600	0.12895	0.046501	386.85	12166.63	110.3025	13.30297
SD	150	-1.436	-1.400	0.161099	0.063897	483.297	15431.31	124.2228	11.03584
Median	163	-1.3661	-1.400	0.161099	0.063897	483.297	15431.31	124.2228	11.03584
Reference Stats	200	-1.1676	-1.200	0.198072	0.085944	594.216	18974.27	137.7471	9.147085
Count	225	-1.0334	-1.000	0.218338	0.098892	655.014	20795.32	144.2058	8.315797
SD	250	-0.8993	-0.900	0.22975	0.113202	719.25	22512.7	150.3752	7.547458
Median	275	-0.7652	-0.800	0.262259	0.12892	786.777	24395.96	156.1921	6.834044
	300	-0.6310	-0.600	0.336687	0.18476	1007.061	29210.4	170.9105	4.956626
	325	-0.4969	-0.500	0.361837	0.206266	1085.511	30527.37	174.7208	4.39953
	350	-0.3627	-0.400	0.389649	0.229172	1165.947	31649.89	177.9042	3.868675
	375	-0.2286	-0.200	0.443789	0.27895	1331.307	33212.15	182.242	2.869226
	400	-0.0944	-0.100	0.471814	0.305606	1415.442	33614.65	183.343	2.393102
	417	-0.0032	0.000	0.5	0.333333	1500	33749.87	183.7114	1.928027
	450	0.1739	0.200	0.556231	0.391392	1668.693	33212.15	182.242	1.017918
	475	0.3080	0.300	0.583998	0.421415	1751.994	32551.92	180.4215	0.566487
	500	0.4421	0.400	0.611351	0.451875	1834.053	31650.28	177.9053	0.113248
	525	0.5763	0.600	0.664313	0.513387	1992.939	29210.8	170.9117	-0.81176
	550	0.7104	0.700	0.689691	0.544073	2069.073	27728.18	166.5178	-1.29039
	575	0.8446	0.800	0.714196	0.574469	2142.588	26112.02	161.5921	-1.78466
	600	0.9787	1.000	0.76025	0.633702	2280.75	22512.7	150.3752	-2.83657
	625	1.1129	1.100	0.781662	0.662216	2344.986	20795.32	144.2058	-3.40337
	650	1.2470	1.200	0.801928	0.6898	2405.784	18974.27	137.7471	-4.00432
	675	1.3811	1.400	0.821015	0.716331	2463.045	17177.93	131.0646	-4.64538
	700	1.5153	1.500	0.839901	0.741698	2516.703	15430.91	124.2212	-5.33325
	721.1	1.6295	1.600	0.855578	0.765812	2566.734	13754.81	117.2809	-6.07544
	746.1	1.7627	1.800	0.885334	0.810016	2656.002	10679.64	103.3423	-7.75869
	771.1	1.8968	1.900	0.898454	0.830022	2695.362	9303.458	96.45443	-8.72082
	796.1	2.0309	2.000	0.910445	0.848605	2731.335	8043.786	89.88716	-9.77894
	821.1	2.1651	2.200	0.931218	0.881527	2793.654	5878.728	76.67286	-12.2528
	846.1	2.2992	2.300	0.940103	0.895917	2820.309	4969.774	70.49663	-13.7043
	871.1	2.4334	2.400	0.948062	0.908982	2844.186	4171.257	64.58527	-15.3283
	896.1	2.5675	2.600	0.96145	0.931365	2884.35	2874.835	53.61749	-19.2129
	921.1	2.7017	2.700	0.967004	0.948017	2901.012	2360.946	48.58957	-21.544
	946.1	2.8358	2.800	0.971891	0.945208	2915.643	1925.492	43.88043	-24.1894
	971.1	2.9699	3.000	0.979848	0.963118	2939.544	1253.533	35.40527	-30.6549
	996.1	3.1041	3.100	0.983053	0.968795	2949.159	1001.092	31.64004	-34.6067
	1021.1	3.2382	3.200	0.985811	0.973725	2957.433	795.0252	28.19619	-39.127
	1046.1	3.3724	3.400	0.990188	0.981636	2970.564	489.9821	22.13554	-50.4331



Based on the number of measurements and the observed standard deviation, a survey unit with a median measurement equal to the background median plus the LBGR (721.1) will have a 1.0 probability that the survey unit will correctly fail (i.e., the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR [i.e., the survey unit is indistinguishable from background] is rejected).

299	R	299	79	0
227	R	227	53	0
206	R	206	42	0
226	R	226	51.5	0
269	R	269	66	0
221	R	221	46.5	0
193	R	193	37	0
211	S	-206.6	20	20
200	S	-217.6	16	16
220	S	-197.6	23	23
223	S	-194.6	25.5	25.5
205	S	-212.6	18	18
168	S	-249.6	4	4
200	S	-217.6	16	16
221	S	-196.6	24	24
219	S	-198.6	22	22
169	S	-248.6	5	5
165	S	-252.6	3	3
348	S	-69.6	30	30
334	S	-83.6	29	29
200	S	-217.6	16	16
187	S	-230.6	10.5	10.5
210	S	-207.6	19	19
178	S	-230.6	6	6
184	S	-233.6	9	9
158	S	-259.6	2	2
142	S	-275.6	1	1
213	S	-204.6	21	21
244	S	-173.6	27	27
183	S	-234.6	7.5	7.5
223	S	-194.6	25.5	25.5
302	S	-115.6	28	28
183	S	-234.6	7.5	7.5
191	S	-226.6	12	12
199	S	-218.6	14	14
187	S	-230.6	10.5	10.5
195	S	-222.6	13	13
Sum =		8515	465	

* This spreadsheet is originally designed to work with a set of twenty measurements, 10 from the survey unit (S) and 10 from the background reference area (R). If a different number of measurements have been performed, it is necessary to modify the spreadsheet to account for the change in the number of measurements.

of R: 100 *n*
of S: 30 *m*
Avg Rank R: 81
Avg Rank S: 16

For *m* or *n* greater than 20, the critical value (*k*) can be calculated for Scenario B from

$$\frac{m(n+m+1)}{2} + z_c \sqrt{\frac{nm(n+m+1)}{12}}$$

z = 97.5% percentile of standard normal distribution = 1.960

k = 2319.7

Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the difference between the survey unit median and the background median is less than the LBGR (i.e., the survey unit is indistinguishable from background) is accepted and the survey unit passes Scenario B

Quantile Test

per Section 7 of NUREG-1505

n (Survey) 30

m (Ref) 100

alpha/2 0.025

From Table A.7

 r 6 k 4 α 0.025If k of the r largest ranks are from the survey unit, the null hypothesis is rejected at the α level of significance.

Alpha Phoswich Ranks

Sorted Ranks Location

3.5 S

3.5 S

3.5 S

3.5 S

3.5 S

3.5 S

12 S

12 S

12 S

12 S

12 S

12 S

12 S

12 S

12 S

12 S

12 S

21 S

21 S

21 S

21 S

21 S

21 S

26.5 R

26.5 R

26.5 R

26.5 R

31.5 S

31.5 S

31.5 S

31.5 S

31.5 S

31.5 S

38.5 R

38.5 R

38.5 R

38.5 R

38.5 R

38.5 R

38.5 R

38.5 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

51 R

Beta Phoswich Ranks

Sorted Ranks Location

1 S

2 S

3 S

4 S

5 S

6 S

7.5 S

7.5 S

9 S

10.5 S

10.5 S

12 S

13 S

14 S

16 S

16 S

16 S

18 S

19 S

20 S

21 S

22 S

23 S

24 S

25.5 S

25.5 S

27 S

28 S

29 S

30 S

31 R

32 R

33 R

34 R

35 R

36 R

37 R

38 R

39.5 R

39.5 R

41 R

42 R

43 R

44 R

45 R

46.5 R

46.5 R

48.5 R

48.5 R

50 R

51.5 R

51.5 R

53 R

54 R

55 R

56 R

57 R

306R7 Alpha-Beta Ph Quantile

51	R	58	R
51	R	59	R
70.5	R	60	R
70.5	R	61	R
70.5	R	62	R
70.5	R	63	R
70.5	R	64	R
70.5	R	65	R
70.5	R	66	R
70.5	R	67	R
70.5	R	68.5	R
70.5	R	68.5	R
70.5	R	70	R
70.5	R	71	R
70.5	R	72	R
70.5	R	73	R
70.5	R	74	R
70.5	R	75.5	R
70.5	R	75.5	R
70.5	R	77	R
70.5	R	78	R
70.5	R	79	R
70.5	R	80	R
70.5	R	81	R
90.5	R	82	R
90.5	R	83	R
90.5	R	84.5	R
90.5	R	84.5	R
90.5	R	86	R
90.5	R	87	R
90.5	R	88	R
90.5	R	89	R
90.5	R	90	R
90.5	R	91	R
90.5	R	92	R
90.5	R	93	R
90.5	R	94	R
90.5	R	95	R
90.5	R	96	R
90.5	R	97	R
90.5	R	98	R
90.5	R	99	R
103.5	R	100	R
103.5	R	101	R
103.5	R	102	R
103.5	R	103	R
103.5	R	104	R
103.5	R	105	R
103.5	R	106	R
103.5	R	107	R
113	R	108	R
113	R	109	R
113	R	110	R
113	R	111	R
113	R	112	R
113	R	113.5	R
113	R	113.5	R
113	R	115	R
113	R	116	R
113	R	117.5	R
113	R	117.5	R
122	R	119	R
122	R	120	R
122	R	121	R

122	R	122	R
122	R	123	R
122	R	124	R
122	R	125	R
126	R	126	R
127.5	R	127	R
127.5	R	128	R
129	R	129	R
130	R	130	R
0 of top 6 from S		0 of top 6 from S	

If the r -th largest measurement is among a group of tied (equal-in-value) measurements, increase r to include the tied measurements. Also increase k by the same amount (EPA 230-R-94-004).

$r=12$

$k=10$

0 of top 12 from S

thesis is rejected.

Reproduction of Table 10-3 from NUREG-1505

(C-LBGR)/SD	p1	p2
-6.0	0.00001	0
-5.0	0.000204	0.00001
-4.0	0.002339	0.000174
-3.5	0.006664	0.000738
-3.0	0.016947	0.00269
-2.5	0.03855	0.008465
-2.0	0.07865	0.023066
-1.9	0.089555	0.027714
-1.8	0.101546	0.033114
-1.7	0.114666	0.039348
-1.6	0.12895	0.046501
-1.5	0.144422	0.054656
-1.4	0.161099	0.063897
-1.3	0.178985	0.074301
-1.2	0.198072	0.085944
-1.1	0.218338	0.098892
-1.0	0.23975	0.113202
-0.9	0.262259	0.12892
-0.8	0.285804	0.146077
-0.7	0.310309	0.164691
-0.6	0.335687	0.18476
-0.5	0.361837	0.206266
-0.4	0.388649	0.229172
-0.3	0.416002	0.253419
-0.2	0.443769	0.27893
-0.1	0.471814	0.305606
0.0	0.5	0.333333
0.1	0.528186	0.361978
0.2	0.556231	0.391392
0.3	0.583998	0.421415
0.4	0.611351	0.451875
0.5	0.638163	0.482593
0.6	0.664313	0.513387
0.7	0.689691	0.544073
0.8	0.714196	0.574469
0.9	0.737741	0.604402
1.0	0.76025	0.633702
1.1	0.781662	0.662216
1.2	0.801928	0.6898
1.3	0.821015	0.716331
1.4	0.838901	0.741698
1.5	0.855578	0.765812
1.6	0.87105	0.788602
1.7	0.885334	0.810016
1.8	0.898454	0.830022
1.9	0.910445	0.848605
2.0	0.92135	0.865767
2.1	0.931218	0.881527
2.2	0.940103	0.895917
2.3	0.948062	0.908982
2.4	0.955157	0.920777
2.5	0.96145	0.931365
2.6	0.967004	0.940817
2.7	0.971881	0.949208
2.8	0.976143	0.956616
2.9	0.979848	0.963118
3.0	0.983053	0.968795
3.1	0.985811	0.973725
3.2	0.988174	0.977981
3.3	0.990188	0.981636
3.4	0.991895	0.984758
3.5	0.993336	0.98741
4.0	0.997661	0.995497
5.0	0.999796	0.999599
6.0	0.999989	0.999978