10. NONPARAMETRIC TOLERANCE LIMITS

10.1 Sample Sizes for One-Sided Nonparametric Tolerance Limits

The quantity tabulated is that value of n such that

$$p^n \leq 1 - \gamma.$$

One finds frequent use for this function when deciding how large a sample is needed to be, say, 100γ percent sure that at least $100p$ percent of any population with a continuous cumulative distribution function lies above the smallest value in a random sample from that population. The quantity n given in the table is the required sample size. A similar statement concerning the largest sample value may also be made. The general procedure for nonparametric tolerance limits was derived by Wilks [246]. Note that in Section 9.6 the values of p which solve the equation $p = (1 - \gamma)^{1/n}$ may be obtained by putting $X = 0$ in the formulas of Section 9.6. In Section 10.2, $1 - (1 - \gamma)^{1/n}$ is tabulated.

$$n = \frac{\ln(1-\gamma)}{\ln p}$$

Owen, D. B. 1962. Handbook of Statistical Tables. Addison-Westly Inc., Reading MA. (UCD HA 48.09 Ref)

Sample Sizes for One-Sided Nonparametric Tolerance Limits

$$p^n \leq 1 - \gamma$$

$$N = \frac{\ln(1-\gamma)}{\ln(p)}$$

confidence

	p (percentile)						
γ	0.500	0.700	0.750	0.800	0.850	0.900	0.950
0.500	1	2	3	4	5	7	14
0.700	2	4	5	6	8	12	24
0.750	3	4	5	7	9	14	28
0.800	3	5	6	8	10	16	32
0.850	3	6	7	9	12	19	37
0.900	4	7	9	11	15	22	45
0.950	5	9	11	14	19	29	59
0.975	6	11	13	17	23	36	72
0.980	6	11	14	18	25	38	77
0.990	7	13	17	21	29	44	90
0.995	8	15	19	24	33	51	104
0.999	10	20	25	31	43	66	135
0.9995	11	22	27	35	47	73	149
0.9999	14	26	33	42	57	88	180

	p						
γ	0.975	0.980	0.990	0.995	0.999	0.9995	0.9999
0.500	28	35	69	139	693	1386	6932
0.700	48	60	120	241	1204	2408	12040
0.750	55	69	138	277	1386	2772	13863
0.800	64	80	161	322	1609	3219	16094
0.850	75	94	189	379	1897	3794	18971
0.900	91	114	230	460	2302	4605	23025
0.950	119	149	299	598	2995	5990	29956
0.975	146	183	368	736	3688	7376	36887
0.980	155	194	390	781	3911	7823	39119
0.990	182	228	459	919	4603	9209	46050
0.995	210	263	528	1058	5296	10594	52981
0.999	273	342	688	1379	6905	13813	69075
0.9995	301	377	757	1517	7598	15199	76006
0.9999	364	456	917	1838	9206	18417	92099