等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學
考試時間：2小時　　座號：_____

※注意：㈠可以使用電子計算器。
㈡不必抄題，作答時請將試題題號及答案依照順序寫在試卷上，於本試題上作答者，不予計分。

一、擲一個公平骰子兩次，㈠試問共有多少種可能情形。（6分）㈡令X為第一次點數，Y為第二次點數，T為MAX(X,Y)，U為MIN(X,Y)，試問T和U的可能情形。（6分）㈢試求P(T=4∪U=3)（8分）

二、祥順集團底下有兩間公司，分別為平順公司和安順公司。已知上個月平順公司的股票上漲機率是0.7，安順公司股票上漲機率是0.6，兩間公司同一天的股票均上漲的機率是0.48，試問：
㈠兩間公司的股票漲跌情形是否獨立？（5分）
㈡上個月中任一天，至少有一間公司股票上漲的機率是多少？（5分）
㈢假設某天平順公司的股票下跌，則當天安順公司的股票也下跌的機率是多少？（5分）
㈣假設某天安順公司的股票上漲，則當天平順公司的股票下跌的機率是多少？（5分）

三、臺灣好茶工廠控制生產線流速（低速、中速、高速）以瞭解生產線流速如何影響茶葉罐重量（單位：公克），經實驗得以下結果：

茶葉罐重量					
低速	47	43	45	44	46
中速	44	43	41	40	42
高速	39	34	38	34	35

㈠建立ANOVA表（10分）
㈡以5%顯著水準檢定生產線流速是否影響茶葉罐平均重量？（$F_{0.05}(2，12)=3.8853$）（10分）

四、設有甲、乙、丙三種不同品種的玫瑰花，分別使用A、B、C、D四種不同的肥料。今隨機選擇面積等條件相同的12塊田地做實驗，得到收穫量（單位：千朵）如下表：

肥料＼品種	甲	乙	丙
A	8	3	7
B	10	4	8
C	6	5	6
D	8	4	7

取顯著水準$\alpha=0.05$，試分別檢定㈠不同品種與㈡不同肥料，所得到的平均收穫量有無顯著差異（假設收穫量呈常態分配，且變異數均相同）（$F_{0.05}(2，6)=5.1433$，$F_{0.05}(3，6)=4.7571$）（20分）

（請接第二頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

五、設某電視台想知道林書豪的比賽轉播收視率在大都市、城市及鄉下有無差異。則自3個區域隨機抽出幾個鄉鎮，並紀錄如下：（單位：千人）

大都市	9	11	14	15	16	
城市	6	7	10	11	12	14
鄉下	5	8	9	10		

㈠請建立 ANOVA 表。（10 分）㈡檢定區間別是否影響收視率(α=0.05)。（10 分）

附表一

二項分配機率值表　　$P(X=x)=C_x^n p^x(1-p)^{n-x}$

		p											
n	x	.01	.05	.10	.20	.30	.40	.50	.60	.70	.80	.90	.95	.99
2	0	.9801	.9025	.8100	.6400	.4900	.3600	.2500	.1600	.0900	.0400	.0100	.0025	.0001
	1	.0198	.0950	.1800	.3200	.4200	.4800	.5000	.4800	.4200	.3200	.1800	.0950	.0198
	2	.0001	.0025	.0100	.0400	.0900	.1600	.2500	.3600	.4900	.6400	.8100	.9025	.9801
3	0	.9703	.8574	.7290	.5120	.3430	.2160	.1250	.0640	.0270	.0080	.0010	.0001	.0000
	1	.0294	.1354	.2430	.3840	.4410	.4320	.3750	.2880	.1890	.0960	.0270	.0071	.0003
	2	.0003	.0071	.0270	.0960	.1890	.2880	.3750	.4320	.4410	.3840	.2430	.1354	.0294
	3	.0000	.0001	.0010	.0080	.0270	.0640	.1250	.2160	.3430	.5120	.7290	.8574	.9703
4	0	.9606	.8145	.6561	.4096	.2401	.1296	.0625	.0256	.0081	.0016	.0001	.0000	.0000
	1	.0388	.1715	.2916	.4096	.4116	.3456	.2500	.1536	.0756	.0256	.0036	.0005	.0000
	2	.0006	.0135	.0486	.1536	.2646	.3456	.3750	.3456	.2646	.1536	.0486	.0135	.0006
	3	.0000	.0005	.0036	.0256	.0756	.1536	.2500	.3456	.4116	.4096	.2916	.1715	.0388
	4	.0000	.0000	.0001	.0016	.0081	.0256	.0625	.1296	.2401	.4096	.6561	.8145	.9606
5	0	.9510	.7738	.5905	.3277	.1681	.0778	.0313	.0102	.0024	.0003	.0000	.0000	.0000
	1	.0480	.2036	.3281	.4096	.3602	.2592	.1563	.0768	.0284	.0064	.0005	.0000	.0000
	2	.0010	.0214	.0729	.2048	.3087	.3456	.3125	.2304	.1323	.0512	.0081	.0011	.0000
	3	.0000	.0011	.0081	.0512	.1323	.2304	.3125	.3456	.3087	.2048	.0729	.0214	.0010
	4	.0000	.0000	.0005	.0064	.0284	.0768	.1563	.2592	.3602	.4096	.3281	.2036	.0480
	5	.0000	.0000	.0000	.0003	.0024	.0102	.0313	.0778	.1681	.3277	.5905	.7738	.9510
6	0	.9415	.7351	.5314	.2621	.1176	.0467	.0156	.0041	.0007	.0001	.0000	.0000	.0000
	1	.0571	.2321	.3543	.3932	.3025	.1866	.0938	.0369	.0102	.0015	.0001	.0000	.0000
	2	.0014	.0305	.0984	.2458	.3241	.3110	.2344	.1382	.0595	.0154	.0012	.0001	.0000
	3	.0000	.0021	.0146	.0819	.1852	.2765	.3125	.2765	.1852	.0819	.0146	.0021	.0000
	4	.0000	.0001	.0012	.0154	.0595	.1382	.2344	.3110	.3241	.2458	.0984	.0305	.0014
	5	.0000	.0000	.0001	.0015	.0102	.0369	.0938	.1866	.3025	.3932	.3543	.2321	.0571
	6	.0000	.0000	.0000	.0001	.0007	.0041	.0156	.0467	.1176	.2621	.5314	.7351	.9415
7	0	.9321	.6983	.4783	.2097	.0824	.0280	.0078	.0016	.0002	.0000	.0000	.0000	.0000
	1	.0659	.2573	.3720	.3670	.2471	.1306	.0547	.0172	.0036	.0004	.0000	.0000	.0000
	2	.0020	.0406	.1240	.2753	.3177	.2613	.1641	.0774	.0250	.0043	.0002	.0000	.0000
	3	.0000	.0036	.0230	.1147	.2269	.2903	.2734	.1935	.0972	.0287	.0026	.0002	.0000
	4	.0000	.0002	.0026	.0287	.0972	.1935	.2734	.2903	.2269	.1147	.0230	.0036	.0000
	5	.0000	.0000	.0002	.0043	.0250	.0774	.1641	.2613	.3177	.2753	.1240	.0406	.0020
	6	.0000	.0000	.0000	.0004	.0036	.0172	.0547	.1306	.2471	.3670	.3720	.2573	.0659
	7	.0000	.0000	.0000	.0000	.0002	.0016	.0078	.0280	.0824	.2097	.4783	.6983	.9321

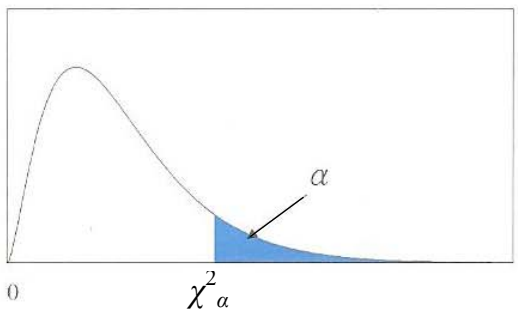
（請接第三頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

附表二

卡方分配臨界值表

$P(\chi^2 > \chi^2_\alpha) = \alpha$



d.f.	$\chi^2_{0.995}$	$\chi^2_{0.990}$	$\chi^2_{0.975}$	$\chi^2_{0.950}$	$\chi^2_{0.900}$
1	0.0000393	0.0001571	0.0009821	0.0039322	0.0157907
2	0.0100247	0.0201004	0.0506357	0.1025862	0.2107208
3	0.0717235	0.1148316	0.2157949	0.3518460	0.5843755
4	0.206984	0.297107	0.484419	0.710724	1.063624
5	0.411751	0.554297	0.831209	1.145477	1.610309
6	0.675733	0.872083	1.237342	1.635380	2.204130
7	0.989251	1.239032	1.689864	2.167349	2.833105
8	1.344403	1.646506	2.179725	2.732633	3.489537
9	1.734911	2.087889	2.700389	3.325115	4.168156
10	2.155845	2.558199	3.246963	3.940295	4.865178
11	2.603202	3.053496	3.815742	4.574809	5.577788
12	3.073785	3.570551	4.403778	5.226028	6.303796
13	3.565042	4.106900	5.008738	5.891861	7.041500
14	4.074659	4.660415	5.628724	6.570632	7.789538
15	4.600874	5.229356	6.262123	7.260935	8.546753
16	5.142164	5.812197	6.907664	7.961639	9.312235
17	5.697274	6.407742	7.564179	8.671754	10.0852
18	6.264766	7.014903	8.230737	9.390448	10.8649
19	6.843923	7.632698	8.906514	10.1170	11.6509
20	7.433811	8.260368	9.590772	10.8508	12.4426
21	8.033602	8.897172	10.2829	11.5913	13.2396
22	8.642681	9.542494	10.9823	12.3380	14.0415
23	9.260383	10.1957	11.6885	13.0905	14.8480
24	9.886199	10.8563	12.4011	13.8484	15.6587
25	10.5196	11.5240	13.1197	14.6114	16.4734
26	11.1602	12.1982	13.8439	15.3792	17.2919
27	11.8077	12.8785	14.5734	16.1514	18.1139
28	12.4613	13.5647	15.3079	16.9279	18.9392
29	13.1211	14.2564	16.0471	17.7084	19.7677
30	13.7867	14.9535	16.7908	18.4927	20.5992
40	20.7066	22.1642	24.4331	26.5093	29.0505
50	27.9908	29.7067	32.3574	34.7642	37.6886
60	35.5344	37.4848	40.4817	43.1880	46.4589
80	51.1719	53.5400	57.1532	60.3915	64.2778
100	67.3275	70.0650	74.2219	77.9294	82.3581

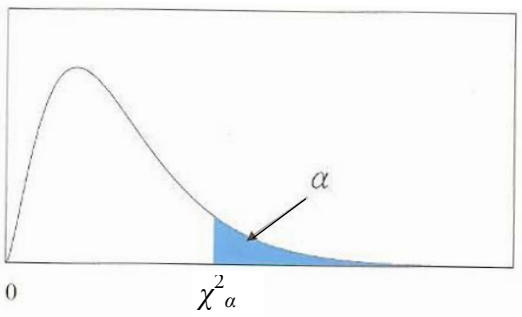
（請接第四頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

附表二（續）

卡方分配臨界值表

$P(\chi^2 > \chi^2_\alpha) = \alpha$



$\chi^2_{0.100}$	$\chi^2_{0.050}$	$\chi^2_{0.025}$	$\chi^2_{0.010}$	$\chi^2_{0.005}$	*d.f.*
2.705541	3.841455	5.023903	6.634891	7.879400	*1*
4.605176	5.991476	7.377779	9.210351	10.5965	*2*
6.251394	7.814725	9.348404	11.3449	12.8381	*3*
7.779434	9.487728	11.1433	13.2767	14.8602	*4*
9.236349	11.0705	12.8325	15.0863	16.7496	*5*
10.6446	12.5916	14.4494	16.8119	18.5475	*6*
12.0170	14.0671	16.0128	18.4753	20.2777	*7*
13.3616	15.5073	17.5345	20.0902	21.9549	*8*
14.6837	16.9190	19.0228	21.6660	23.5893	*9*
15.9872	18.3070	20.4832	23.2093	25.1881	*10*
17.2750	19.6752	21.9200	24.7250	26.7569	*11*
18.5493	21.0261	23.3367	26.2170	28.2997	*12*
19.8119	22.3620	24.7356	27.6882	29.8193	*13*
21.0641	23.6848	26.1189	29.1412	31.3194	*14*
22.3071	24.9958	27.4884	30.5780	32.8015	*15*
23.5418	26.2962	28.8453	31.9999	34.2671	*16*
24.7690	27.5871	30.1910	33.4087	35.7184	*17*
25.9894	28.8693	31.5264	34.8052	37.1564	*18*
27.2036	30.1435	32.8523	36.1908	38.5821	*19*
28.4120	31.4104	34.1696	37.5663	39.9969	*20*
29.6151	32.6706	35.4789	38.9322	41.4009	*21*
30.8133	33.9245	36.7807	40.2894	42.7957	*22*
32.0069	35.1725	38.0756	41.6383	44.1814	*23*
33.1962	36.4150	39.3641	42.9798	45.5584	*24*
34.3816	37.6525	40.6465	44.3140	46.9280	*25*
35.5632	38.8851	41.9231	45.6416	48.2898	*26*
36.7412	40.1133	43.1945	46.9628	49.6450	*27*
37.9159	41.3372	44.4608	48.2782	50.9936	*28*
39.0875	42.5569	45.7223	49.5878	52.3355	*29*
40.2560	43.7730	46.9792	50.8922	53.6719	*30*
51.8050	55.7585	59.3417	63.6908	66.7660	*40*
63.1671	67.5048	71.4202	76.1538	79.4898	*50*
74.3970	79.0820	83.2977	88.3794	91.9518	*60*
96.5782	101.879	106.629	112.329	116.321	*80*
118.498	124.342	129.561	135.807	140.170	*100*

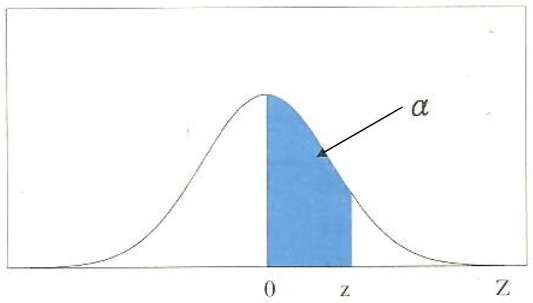
（請接第五頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

附表三

標準常態累加機率值表

$P(0 < Z < z) = \alpha$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

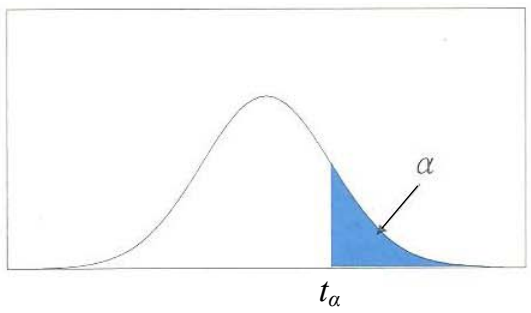
（請接第六頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

附表四

t 分配臨界值表

$P(t > t_\alpha) = \alpha$



d.f.	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	*d.f.*
1	3.078	6.314	12.706	31.821	63.656	*1*
2	1.886	2.920	4.303	6.965	9.925	*2*
3	1.638	2.353	3.182	4.541	5.841	*3*
4	1.533	2.132	2.776	3.747	4.604	*4*
5	1.476	2.015	2.571	3.365	4.032	*5*
6	1.440	1.943	2.447	3.143	3.707	*6*
7	1.415	1.895	2.365	2.998	3.499	*7*
8	1.397	1.860	2.306	2.896	3.355	*8*
9	1.383	1.833	2.262	2.821	3.250	*9*
10	1.372	1.812	2.228	2.764	3.169	*10*
11	1.363	1.796	2.201	2.718	3.106	*11*
12	1.356	1.782	2.179	2.681	3.055	*12*
13	1.350	1.771	2.160	2.650	3.012	*13*
14	1.345	1.761	2.145	2.624	2.977	*14*
15	1.341	1.753	2.131	2.602	2.947	*15*
16	1.337	1.746	2.120	2.583	2.921	*16*
17	1.333	1.740	2.110	2.567	2.898	*17*
18	1.330	1.734	2.101	2.552	2.878	*18*
19	1.328	1.729	2.093	2.539	2.861	*19*
20	1.325	1.725	2.086	2.528	2.845	*20*
21	1.323	1.721	2.080	2.518	2.831	*21*
22	1.321	1.717	2.074	2.508	2.819	*22*
23	1.319	1.714	2.069	2.500	2.807	*23*
24	1.318	1.711	2.064	2.492	2.797	*24*
25	1.316	1.708	2.060	2.485	2.787	*25*
26	1.315	1.706	2.056	2.479	2.779	*26*
27	1.314	1.703	2.052	2.473	2.771	*27*
28	1.313	1.701	2.048	2.467	2.763	*28*
29	1.311	1.699	2.045	2.462	2.756	*29*
∞	1.282	1.645	1.960	2.326	2.576	∞

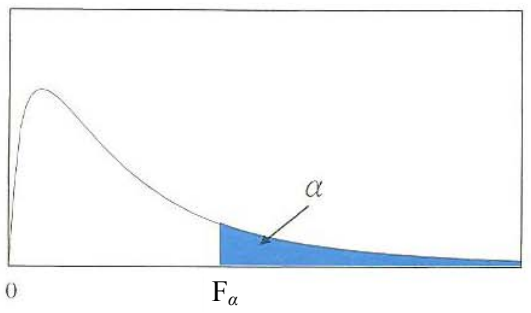
（請接第七頁）

等　　別：三等關務人員考試
類(科)別：關稅統計
科　　目：統計學

附表五

F 分配臨界值表

$P(F > F_\alpha) = \alpha$



	ν_1(d.f.)				$\alpha = 0.05$				
ν_2(d.f.)	1	2	3	4	5	6	7	8	9
1	161.45	199.50	215.71	224.58	230.16	233.99	236.77	238.88	240.54
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04
120	3.92	3.07	2.68	2.45	2.29	2.18	2.09	2.02	1.96
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88