

1. 假設國小學生通學只有「家長接送」與「自行通學」兩種方式，銘傳國小邱校長想估計該校學生通學由家長接送的比例。邱校長隨機抽樣調查 200 位學生，其中有 120 位學生由家長接送。請問在 95%信賴區間條件下，邱校長估計該校學生通學由家長接送的比例範圍為何？(20%)
2. 郝市長想估計去年有使用公共自行車的台北市市民比例，但不知如何決定調查樣本數。假設東亞其它城市每年會使用到公共自行車的市民比例大約為 20%，在至少達到 95%信賴區間以及 5%取樣誤差的條件下，最小的取樣規模應該為何？(20%)
3. 假設到動物園參觀的遊客有兩種：「進熊貓館」與「不進熊貓館」，每位遊客都從住家出發到動物園，這段旅程距離稱為「旅行距離」。動物園林園長推測進熊貓館遊客的旅行距離超過不進熊貓館遊客至少 2 公里以上，為檢驗這個推測，林園長隨機調查 115 位進熊貓館遊客以及 95 位不進熊貓館遊客，得知：進熊貓館遊客樣本旅行距離平均值 14.8 公里、標準差 23.2；不進熊貓館遊客樣本旅行距離平均值 6.2 公里、標準差 17.5。假設進熊貓館遊客與不進熊貓館遊客兩群母體旅行距離變異數相同，請問林園長的推測是否被樣本支持？(20%)
4. 在台灣的三個都會區（高雄、台中、與台北），從 20 年的 1 月份雨量記錄，各隨機挑選 5 天的日降雨量 (mm/day)，數據彙整如下表所示。在 $\alpha = 0.05$ ，利用統計檢定方法，試推論這三個都會區 1 月的日降雨量是否相同？(20%)

單位：日降雨量 (mm/day)

抽樣的樣本編號	都會區		
	高雄	台中	台北
1	8.5	8.7	10.5
2	8.9	9.0	11.5
3	9.1	9.2	11.8
4	9.0	9.7	11.6
5	8.8	9.5	11.2

見背面







5. 某項調查研究，在研究地區以隨機抽樣方式，調查 6696 家戶的所得狀況，並加以分類，調查範圍涵蓋各種不同型態的城鎮，其調查的結果，彙整如下表。在 $\alpha=0.05$ ，利用統計檢定方法，試推論該地區的城鎮型態與家戶所得是否有關？(20%)

單位：家戶數

		城鎮型態		
		新市鎮	農村型	都會型
家戶的 所得狀況	高收入戶	529	377	1282
	中高收入戶	195	242	1303
	中度收入戶	73	158	779
	中低收入	40	73	821
	低收入戶	156	124	544

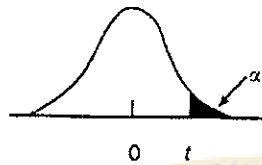
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Standard Normal Probabilities

z						
	$P(-z < Z < z)$	$P(Z > z)$	$P(Z > z)$	$P(Z < -z)$	$P(Z < z)$	$P(Z > -z)$
0.50	0.383	0.617	0.309	0.309	0.691	0.691
0.60	0.451	0.549	0.274	0.274	0.726	0.726
0.70	0.516	0.484	0.242	0.242	0.760	0.758
0.80	0.576	0.424	0.212	0.212	0.788	0.788
0.90	0.632	0.368	0.184	0.184	0.816	0.816
1.00	0.683	0.317	0.159	0.159	0.841	0.841
1.28	0.800	0.200	0.100	0.100	0.900	0.900
1.50	0.866	0.134	0.067	0.067	0.933	0.933
1.60	0.890	0.110	0.055	0.055	0.945	0.945
1.65	0.900	0.100	0.050	0.050	0.950	0.950
1.70	0.911	0.089	0.045	0.045	0.955	0.955
1.80	0.928	0.072	0.036	0.036	0.964	0.964
1.90	0.943	0.057	0.029	0.029	0.971	0.971
1.96	0.950	0.050	0.025	0.025	0.975	0.975
2.00	0.954	0.046	0.023	0.023	0.977	0.977
2.10	0.964	0.036	0.018	0.018	0.982	0.982
2.20	0.972	0.028	0.014	0.014	0.986	0.986
2.30	0.979	0.021	0.011	0.011	0.989	0.989
2.40	0.984	0.016	0.008	0.008	0.992	0.992
2.50	0.988	0.012	0.006	0.006	0.994	0.994
2.58	0.990	0.010	0.005	0.005	0.995	0.995
2.60	0.991	0.009	0.005	0.005	0.995	0.995
2.70	0.993	0.007	0.003	0.003	0.997	0.997
2.80	0.995	0.005	0.003	0.003	0.997	0.997
2.90	0.996	0.004	0.002	0.002	0.998	0.998
3.00	0.997	0.003	0.001	0.001	0.999	0.999
3.10	0.998	0.002	0.001	0.001	0.999	0.999
3.20	0.999	0.001	0.001	0.001	0.999	0.999
3.30	0.999	0.001	0.000	0.000	1.000	1.000
3.40	0.999	0.001	0.000	0.000	1.000	1.000
3.50	1.000	0.000	0.000	0.000	1.000	1.000

見背面

t Distribution



df	.10	.05	.025	.01	.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576

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F - Distribution ($\alpha = 0.05$ in the Right Tail)

df ₂	df ₁	Numerator Degrees of Freedom								
		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		18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385
3		10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123
4		7.7086	7.9943	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	6.9988
5		6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725
6		5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.0990
7		5.5914	4.7374	4.3468	4.1203	3.9715	3.8660	3.7870	3.7257	3.6767
8		5.3177	4.4590	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881
9		5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789
10		4.9646	4.1028	3.7083	3.4780	3.3258	3.2172	3.1355	3.0717	3.0204
11		4.8443	3.9823	3.5874	3.3567	3.2039	3.0948	3.0123	2.9480	2.8962
12		4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964
13		4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144
14		4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458
15		4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876
16		4.4940	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377
17		4.4513	3.5915	3.1968	2.9647	2.8100	2.6987	2.6143	2.5480	2.4943
18		4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563
19		4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4229
20		4.3512	3.4928	3.0984	2.8661	2.7109	2.5990	2.5140	2.4471	2.3928
21		4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.3660
22		4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419
23		4.2793	3.4221	3.0280	2.7955	2.6400	2.5277	2.4422	2.3748	2.3201
24		4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002
25		4.2417	3.3852	2.9912	2.7587	2.6030	2.4904	2.4047	2.3371	2.2821
26		4.2252	3.3690	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655
27		4.2100	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501
28		4.1960	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.2360
29		4.1830	3.3277	2.9340	2.7014	2.5454	2.4324	2.3463	2.2783	2.2229
30		4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107
40		4.0847	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240
60		4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.0970	2.0401
120		3.9201	3.0718	2.6802	2.4472	2.2899	2.1750	2.0868	2.0164	1.9588
∞		3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799

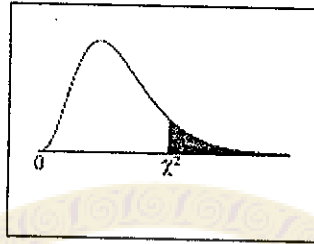
見背面

F - Distribution ($\alpha = 0.05$ in the Right Tail)

df ₂ \ df ₁	Numerator Degrees of Freedom										
	10	12	15	20	24	30	40	60	120	∞	
1	241.88	243.91	245.95	248.01	249.05	250.10	251.14	252.20	253.25	254.31	
2	19.396	19.413	19.429	19.446	19.454	19.462	19.471	19.479	19.487	19.496	
3	8.7855	8.7446	8.7029	8.6602	8.6385	8.6166	8.5944	8.5720	8.5494	8.5264	
4	5.9644	5.9117	5.8578	5.8025	5.7744	5.7459	5.7170	5.6877	5.6581	5.6281	
5	4.7351	4.6777	4.6188	4.5581	4.5272	4.4957	4.4638	4.4314	4.3985	4.3650	
6	4.0600	3.9999	3.9381	3.8742	3.8415	3.8082	3.7743	3.7398	3.7047	3.6689	
7	3.6365	3.5747	3.5107	3.4445	3.4105	3.3758	3.3404	3.3043	3.2674	3.2298	
8	3.3472	3.2839	3.2184	3.1503	3.1152	3.0794	3.0428	3.0053	2.9669	2.9276	
9	3.1373	3.0729	3.0061	2.9365	2.9005	2.8637	2.8259	2.7872	2.7475	2.7067	
10	2.9782	2.9130	2.8450	2.7740	2.7372	2.6996	2.6609	2.6211	2.5801	2.5379	
11	2.8536	2.7876	2.7186	2.6464	2.6090	2.5705	2.5309	2.4901	2.4480	2.4045	
12	2.7534	2.6866	2.6169	2.5436	2.5055	2.4663	2.4259	2.3842	2.3410	2.2962	
13	2.6710	2.6037	2.5331	2.4589	2.4202	2.3803	2.3392	2.2966	2.2524	2.2064	
14	2.6022	2.5342	2.4630	2.3879	2.3487	2.3082	2.2664	2.2229	2.1778	2.1307	
15	2.5437	2.4753	2.4034	2.3275	2.2878	2.2468	2.2043	2.1601	2.1141	2.0658	
16	2.4935	2.4247	2.3522	2.2756	2.2354	2.1938	2.1507	2.1058	2.0589	2.0096	
17	2.4499	2.3807	2.3077	2.2304	2.1898	2.1477	2.1040	2.0584	2.0107	1.9604	
18	2.4117	2.3421	2.2686	2.1906	2.1497	2.1071	2.0629	2.0166	1.9681	1.9168	
19	2.3779	2.3080	2.2341	2.1555	2.1141	2.0712	2.0264	1.9795	1.9302	1.8780	
20	2.3479	2.2776	2.2033	2.1242	2.0825	2.0391	1.9938	1.9464	1.8963	1.8432	
21	2.3210	2.2504	2.1757	2.0960	2.0540	2.0102	1.9645	1.9165	1.8657	1.8117	
22	2.2967	2.2258	2.1508	2.0707	2.0283	1.9842	1.9380	1.8894	1.8380	1.7831	
23	2.2747	2.2036	2.1282	2.0476	2.0050	1.9605	1.9139	1.8648	1.8128	1.7570	
24	2.2547	2.1834	2.1077	2.0267	1.9838	1.9390	1.8920	1.8424	1.7896	1.7330	
25	2.2365	2.1649	2.0889	2.0075	1.9643	1.9192	1.8718	1.8217	1.7684	1.7110	
26	2.2197	2.1479	2.0716	1.9898	1.9464	1.9010	1.8533	1.8027	1.7488	1.6906	
27	2.2043	2.1323	2.0558	1.9736	1.9299	1.8842	1.8361	1.7851	1.7306	1.6717	
28	2.1900	2.1179	2.0411	1.9586	1.9147	1.8687	1.8203	1.7689	1.7138	1.6541	
29	2.1768	2.1045	2.0275	1.9446	1.9005	1.8543	1.8055	1.7537	1.6981	1.6376	
30	2.1646	2.0921	2.0148	1.9317	1.8874	1.8409	1.7918	1.7396	1.6835	1.6223	
40	2.0772	2.0035	1.9245	1.8389	1.7929	1.7444	1.6928	1.6373	1.5766	1.5089	
60	1.9926	1.9174	1.8364	1.7480	1.7001	1.6491	1.5943	1.5343	1.4673	1.3939	
120	1.9105	1.8337	1.7505	1.6587	1.6084	1.5543	1.4952	1.4290	1.3549	1.2539	
∞	1.8307	1.7522	1.6664	1.5705	1.5173	1.4591	1.3940	1.3180	1.2214	1.0000	

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Chi-Square Distribution Table



The shaded area is equal to α for $\chi^2 = \chi^2_{\alpha}$.

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.800}$	$\chi^2_{.700}$	$\chi^2_{.600}$	$\chi^2_{.500}$	$\chi^2_{.400}$	$\chi^2_{.300}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879	10.597
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597	13.838
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838	14.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860	16.750
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750	18.548
6	0.676	0.872	1.237	1.635	2.204	10.646	12.592	14.449	16.812	18.548	20.278
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278	21.955
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955	23.589
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589	25.188
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188	26.757
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757	28.300
12	3.074	3.571	4.401	5.226	6.304	18.549	21.026	23.337	26.217	28.300	29.819
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819	31.319
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319	32.801
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801	34.267
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267	35.718
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718	37.156
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.520	34.805	37.156	38.582
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582	39.997
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997	41.401
21	8.034	8.907	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401	42.796
22	8.643	9.572	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796	44.181
23	9.260	10.256	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181	45.559
24	9.886	10.956	12.401	13.843	15.659	33.196	36.415	39.364	42.980	45.559	46.928
25	10.520	11.671	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928	48.290
26	11.160	12.401	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290	49.645
27	11.808	13.146	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645	50.993
28	12.461	13.905	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993	52.336
29	13.121	14.678	16.047	17.708	19.768	39.087	42.567	45.722	49.588	52.336	53.672
30	13.787	15.463	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672	55.000
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766	79.490
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490	91.952
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952	104.215
70	43.275	45.442	48.758	51.730	55.329	85.527	90.531	95.023	100.425	104.215	116.321
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321	128.299
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299	140.169
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169	

試題隨卷繳回