

第壹部份(50%)

一. Hospital records show the following number of days of hospitalization for 20 patients:

5 7 7 15
 21 15 22 10
 10 6 8 18
 14 5 7 8
 3 8 4 10

- a). Construct frequency and relative frequency distributions for the data.(5%)
 b). Construct a cumulative relative frequency distribution for the data.(5%)

二. A sample of ten stocks on the New York Stock Exchange shows the following price/earning ratios,

9, 4, 6, 7, 3, 11, 4, 6, 4, 7

Using the above data compute the mean, median, mode, range, variance, and standard deviation.(10%)

三. The NCKU Manufacturing Company purchases a certain part from three suppliers *A*, *B*, and *C*. Supplier *A* supplies 60% of parts, *B* 30%, and *C* 10%. The quality of parts is known to vary among suppliers, with *A*, *B*, and *C* parts having 0.25%, 1%, and 2% defective rates, respectively. The parts are used in one of the company's major products.

- a). What is the probability that the company's major product is assembled with a defective part?(5%)
 b). When a defective part is found, which supplier is the likely source?(5%)

四. A salesperson contacts eight potential customers per day. From past experience we know that the probability of a potential customer making a purchase is 0.10.

- a). What is the probability the salesperson makes exactly two sales in a day? (5%)
 b). What is the probability the salesperson makes at least two sales in a day? (5%)

五. Consider the following joint probability distribution of x = time of arrival and y = traffic conditions, where x and y take on values as follows:

Arrival Time	Value of x
Early	1
On-time	2
Late	3

Traffic Conditions	Value of y
Light	1
Moderate	2
Haevy	3

The joint probability distribution of x and y is given below.

$x \backslash y$	1	2	3
1	0.12	0.06	0.02
2	0.25	0.15	0.10
3	0.04	0.06	0.20

- a). Is this joint probability distribution a valid probability distribution? Explain. (5%)
 b). Are the random variables x and y independent? Explain. (5%)

六. 簡答題：12%

1. (a)二項隨機變數實驗應具備那四種特質？(6%) (b)二項分配與波氏(Poisson) 分配之間有何關係？(2%)
2. 何謂統計獨立(Statistical Independence)？(2%)
3. 何謂條件機率函數(Conditional Probability Function) (2%)？

七. 計算題：38%

1. 墾丁國家公園針對遊客進行一項滿意度調查，其調查結果如下：(5%)

職業別	滿意	無意見	不滿意
學生	40	16	24
工	16	8	10
商	16	12	12
公教	26	5	10

試以 $\alpha=0.05$ 檢定職業別與滿意度是否有關？

2. 欲檢定一種新的色彩教學法比現行色彩教學法更能有效增進大專生學習能力，將 16 位大專生隨機分成二組，每組 8 個人，一組採用現行色彩教學法，而另一組採用新的色彩教學法，學期末進行色彩測驗，16 位大專生之測驗成績如下：(10%)

舊教學法	63	65	68	67	71	70	73	76
新教學法	80	78	74	75	77	72	69	81

(1)試以 $\alpha=0.05$ 檢定新教學法是否優於舊教學法，(2)並求新、舊教學法測驗成績之 95%信賴區間為何？

3. 一學術機構受委託代為檢定四種品牌汽車(A, B, C, D)之耗油量性能，規定選用三種不同汽油(甲, 乙, 丙)，量測每加侖平均行駛之哩程數做為判斷之基準，每加侖平均行駛之哩程數如下：(10%)

	A	B	C	D
甲	15	20	13	20
乙	13	18	12	13
丙	23	34	20	27

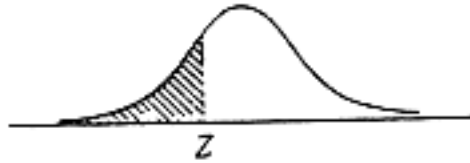
試以 $\alpha=0.05$ (1)檢定三種不同汽油(甲, 乙, 丙)，每加侖平均行駛之哩程數是否相同？(2)檢定四種品牌汽車(A, B, C, D)，每加侖平均行駛之哩程數是否相同？

4. 某義大利咖啡販賣機可加以調節控制，根據資料得知此義大利咖啡販賣機飲料量之標準差為 5 公克之常態分配，試問要定平均數(μ)為多少之咖啡量，才能使得賣出咖啡量超過 90 公克的機率等於 1%。(5%)

5. 已知 50 個產品中有 2 個瑕疵品，若任取 5 個檢定而不放回，求(1) 5 個產品中至少有 1 個瑕疵品的機率為何？(4%) (2)若希望至少有 1 個瑕疵品的機率超過 1/2，則須檢查多少個產品？(4%)

參考資料

附表 1 標準常態分配



z	0	1	2	3	4	5	6	7	8	9
-3	.0013	.0010	.0007	.0005	.0003	.0002	.0002	.0001	.0001	.0001
-2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0126	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0238	.0233
-1.8	.0359	.0352	.0344	.0336	.0329	.0322	.0314	.0307	.0300	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0570	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379

附表 2 χ^2 分配



自由度	機率 $1-\alpha$							
	.005	.010	.025	.050	.950	.975	.990	.995
1	---	---	---	.004	3.84	5.02	6.63	7.88
2	.01	.02	.05	.10	5.99	7.38	9.21	10.60
3	.07	.11	.22	.35	7.81	9.35	11.34	12.84
4	.21	.30	.48	.71	9.49	11.14	13.28	14.86
5	.41	.55	.83	1.15	11.07	12.83	15.09	16.75
6	.68	.87	1.24	1.64	12.59	14.45	16.81	18.55
7	.99	1.24	1.69	2.17	14.07	16.01	18.48	20.28
8	1.34	1.65	2.18	2.73	15.51	17.53	20.09	21.96
9	1.73	2.09	2.70	3.33	16.92	19.02	21.67	23.59
10	2.16	2.56	3.25	3.94	18.31	20.48	23.21	25.19
11	2.60	3.05	3.82	4.57	19.68	21.92	24.72	26.76
12	3.07	3.57	4.40	5.23	21.03	23.34	26.22	28.30
13	3.57	4.11	5.01	5.89	22.36	24.74	27.69	29.82
14	4.07	4.66	5.63	6.57	23.68	26.12	29.14	31.32
15	4.60	5.23	6.26	7.26	25.00	27.49	30.58	32.80
16	5.14	5.81	6.91	7.96	26.30	28.85	32.00	34.27
17	5.70	6.41	7.56	8.67	27.59	30.19	33.41	35.72
18	6.26	7.01	8.23	9.39	28.87	31.53	34.81	37.16
19	6.84	7.63	8.91	10.12	30.14	32.85	36.19	38.58
20	7.43	8.26	9.59	10.85	31.41	34.17	37.57	40.00

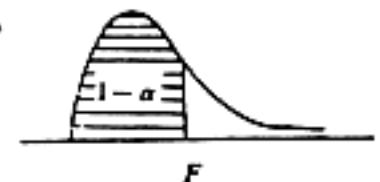
(限於篇幅 祇給一半資料)

附表 3 t 分配



自由度	機率 $1-\alpha$				
	.90	.95	.975	.99	.995
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	1.382	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	2.713	3.106
12	1.356	1.782	2.179	2.681	3.053
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.621	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

附表 4 F 分配



$1-\alpha=0.95$

n	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	8.8860	8.8452	8.8123
4	7.7086	6.9443	6.5914	6.3883	6.2560	6.1631	6.0942	6.0410	5.9988
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	4.2066	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	3.8378	3.6875	3.5806	3.5005	3.4381	3.3881
9	5.1174	4.2565	3.8626	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	3.0946	3.0123	2.9480	2.8962
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7961
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7141
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458