



本試題共七題，合計 100 分，請依題號作答並將答案寫在答案卷上，違者不予計分。

- In the daily production of a certain kind of rope, the number of defects per foot  $Y$  is assumed to have a Poisson distribution with mean  $\lambda = 2$ . The profit per foot when the rope is sold is given by  $X$ , where  $X = 50 - 2Y - Y^2$ . Find the expected profit per foot. (10%)
- Three brands of coffee,  $X, Y, Z$ , are to be ranked according to taste by a judge. Define the following events:
 

A: Brand $X$ is preferred to $Y$ .	B: Brand $X$ is ranked best.
C: Brand $X$ is ranked second best.	D: Brand $X$ is ranked third best.

 If the judge actually has no taste preference and thus randomly assigns ranks to the brands, is event  $A$  independent of events  $B, C$ , and  $D$ ? (10%)
- A manufacturer of tires wants to advertise a mileage interval that excludes no more than 10% of the mileages on tires he sells. All he knows is that, for a large number of tires tested, the mean mileage was 25,000 miles, with a standard deviation of 4,000 miles. What interval would you suggest? (10%)
- Let  $X_1, X_2, X_3$  be mutually independent random variables with Poisson distributions having means 2, 1, 4, respectively.
  - Find the distribution of  $Y = X_1 + X_2 + X_3$  and its expected value and variance. (5%)
  - Compute  $P(3 \leq Y \leq 9)$ . (5%)
- The service times for customers coming through a checkout counter in a retail store are independent random variables with a mean of 1.5 minutes and a variance of 1.0. Will it be possible that 100 customers can be served in less than 2 hours of total service time? (10%)
- 經隨機調查某送貨員 9 次所收取貨款(元)( $X$ )與其所行駛里程(公尺)( $Y$ )之間的關係，其資料如下：

$X$	3450	2650	4820	5760	3720	4365	5860	6620	5160
$Y$	1743	1190	2672	3236	1878	2302	3343	3678	2865

- 試求迴歸直線  $\hat{Y} = \hat{\alpha} + \hat{\beta}X$ 。(10%)
- 請以 5% 之顯著水準檢定此迴歸模型是否合適。(15%)

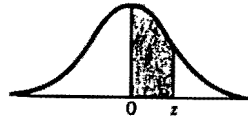


7. 下表是某知名 NBA 籃球選手之 2012 年球季目前的出賽記錄，請檢定其出賽時間 30 分鐘以上與不到 30 分鐘的投籃命中率與得分是否有差異，並請說明檢定時所需之條件， $\alpha=0.05$ 。(25%)

出賽日期	對手	出賽時間	投籃(命中-出手)	得分
2/23	熱火	34	1-11	8
2/22	老鷹	32	6-11	17
2/20	籃網	36	7-18	21
2/19	小牛	46	11-20	28
2/17	黃蜂	40	8-18	26
2/15	國王	26	4-6	10
2/14	暴龍	43	9-20	27
2/11	灰狼	39	8-24	20
2/10	湖人	39	13-23	38
2/08	巫師	36	9-14	23
2/06	爵士	45	10-17	28
2/04	籃網	36	10-19	25
2/03	塞爾蒂克	7	0-3	2
1/31	活塞	6	1-1	4
1/28	火箭	20	3-9	9
1/24	山貓	6	2-2	8
1/14	雷霆	5	1-1	3
1/07	活塞	4	1-1	4
12/31	國王	4	0-1	0
12/29	湖人	2	0-1	2
12/28	勇士	1	0-1	0



TABLE 3 Normal Curve Areas



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

This table is abridged from Table 1 of *Statistical Tables and Formulas*, by A. Hald (New York: John Wiley & Sons, Inc., 1952). Reproduced by permission of A. Hald and the publishers, John Wiley & Sons, Inc.

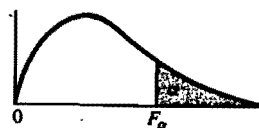
TABLE 4 Critical Values of t



	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	d.f.
1	3.078	6.314	12.706	31.821	63.657	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
inf.	1.282	1.645	1.960	2.326	2.576	inf.

From "Table of Percentage Points of the t-Distribution." Computed by Maxine Merrington, *Biometrika*, Vol. 32 (1941), p. 300. Reproduced by permission of Professor E. S. Pearson.

TABLE 6 Percentage Points of the F Distribution;  $\alpha = .05$



$v_2$ (d.f.)	$v_1$ (d.f.)								
	1	2	3	4	5	6	7	8	9
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5
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	2.17	2.09	2.02	1.96
$\infty$	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88

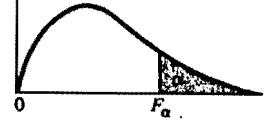
TABLE 6 (Continued)

$v_2$ (d.f.)	$v_1$ (d.f.)									
	10	12	15	20	24	30	40	60	120	$\infty$
1	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
$\infty$	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00

From "Tables of Percentage Points of the Inverted Beta (F) Distribution," *Biometrika*, Vol. 33 (1946) pp. 73-88, by Maxine Merrington and Catherine M. Thompson. Reproduced by permission of Professor E. S. Pearson.



TABLE 7 Percentage Points of the F Distribution;  $\alpha = .01$



$v_2$ (d.f.)	$v_1$ (d.f.)								
	1	2	3	4	5	6	7	8	9
1	4052	4999.5	5403	5625	5764	5859	5928	5982	6022
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56
$\infty$	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41

TABLE 7 (Continued)

$v_2$ (d.f.)	$v_1$ (d.f.)									
	10	12	15	20	24	30	40	60	120	$\infty$
6056	99.40	99.42	99.43	99.45	99.46	99.47	99.47	99.48	99.49	99.50
6106	27.23	27.05	26.87	26.69	26.60	26.50	26.41	26.32	26.22	26.13
6157	14.55	14.37	14.20	14.02	13.93	13.84	13.75	13.65	13.56	13.46
6209	10.05	9.89	9.72	9.55	9.47	9.38	9.29	9.20	9.11	9.02
6235	7.87	7.72	7.56	7.40	7.31	7.23	7.14	7.06	6.97	6.88
6261	6.62	6.47	6.31	6.16	6.07	5.99	5.91	5.82	5.74	5.65
6287	5.81	5.67	5.52	5.36	5.28	5.20	5.12	5.03	4.95	4.86
6313	5.26	5.11	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31
6339	4.85	4.71	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91
6366	4.54	4.40	4.25	4.10	4.02	3.94	3.86	3.78	3.69	3.60
1	4.30	4.16	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36
2	4.10	3.96	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17
3	3.94	3.80	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00
4	3.80	3.67	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87
5	3.69	3.55	3.41	3.26	3.18	3.10	3.02	2.93	2.84	2.75
6	3.59	3.46	3.31	3.16	3.08	3.00	2.92	2.83	2.75	2.65
7	3.51	3.37	3.23	3.08	3.00	2.92	2.84	2.75	2.66	2.57
8	3.43	3.30	3.15	3.00	2.92	2.84	2.76	2.67	2.58	2.49
9	3.37	3.23	3.09	2.94	2.86	2.78	2.69	2.61	2.52	2.42
10	3.31	3.17	3.03	2.88	2.80	2.72	2.64	2.55	2.46	2.36
11	3.26	3.12	2.98	2.83	2.75	2.67	2.58	2.50	2.40	2.31
12	3.21	3.07	2.93	2.78	2.70	2.62	2.54	2.45	2.35	2.26
13	3.17	3.03	2.89	2.74	2.66	2.58	2.49	2.40	2.31	2.21
14	3.13	2.99	2.85	2.70	2.62	2.54	2.45	2.36	2.27	2.17
15	3.09	2.96	2.81	2.66	2.58	2.50	2.42	2.33	2.23	2.13
16	3.06	2.93	2.78	2.63	2.55	2.47	2.38	2.29	2.20	2.10
17	3.03	2.90	2.75	2.60	2.52	2.44	2.35	2.26	2.17	2.06
18	3.00	2.87	2.73	2.57	2.49	2.41	2.33	2.23	2.14	2.03
19	2.98	2.84	2.70	2.55	2.47	2.39	2.30	2.21	2.11	2.01
20	2.80	2.66	2.52	2.37	2.29	2.20	2.11	2.02	1.92	1.80
21	2.63	2.50	2.35	2.20	2.12	2.03	1.94	1.84	1.73	1.60
22	2.47	2.34	2.19	2.03	1.95	1.86	1.76	1.66	1.53	1.38
23	2.32	2.18	2.04	1.88	1.79	1.70	1.59	1.47	1.32	1.00

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國立雲林科技大學  
101 學年度碩士班暨碩士在職專班招生考試試題

系所：運籌所  
科目：統計學(2)