

考試科目	統計學	所別	金融	考試時間	3月16日 星期日	第 / 節
<p>1. (20%) A fast-food restaurant finds that its daily profits have a normal distribution with mean US\$140 and standard deviation US\$80.</p> <p>(1) (6%) Find the probability that the restaurant loses money on a given day.</p> <p>(2) (5%) Find the probability that the restaurant makes money for the next seven days in a row.</p> <p>(3) (5%) What is the expected number of days that the restaurant makes money for the next seven days in a row?</p> <p>(4) (4%) What assumptions must you make for this calculation to be valid for parts (2) and (3)?</p> <p>2. (30%) For a large supermarket chain, a women's group claimed that female employees were passed over for management training in favor of their male colleagues. The company denied this claim, saying that they picked the employees from the eligible pool at random to receive this training. The large pool of more than 1000 eligible employees who can be tapped for management training is 40% female and 60% male. Since this program began, 28 of the 40 employees chosen for management training were male and 12 were female.</p> <p>(1) (3%) In a significant test, the random sampling assumption is the claim of the company. Let p be the probability of selecting a male for any given selection. State the null and alternative hypotheses for a test based on p to investigate the strength of evidence to support the women's claim.</p> <p>(2) (8%) Conduct a statistical test for part (1) using a 0.05 significance level.</p> <p>(3) (5%) Find and interpret the P-value for this test.</p> <p>(4) (6%) Construct a 95% confidence interval for p.</p> <p>(5) (8%) What is the probability of committing a type II error when $p = 0.4$?</p> <p>3. (20%) A tax assessor wants to estimate the mean property tax bill for all homeowners in a small town. A survey ten years ago got a sample mean and standard deviation of \$1400 and \$1000, respectively.</p> <p>(1) (6%) How many tax records should the tax processor randomly sample in order for a 95% confidence interval for the mean to have a margin error equal to \$100?</p>						
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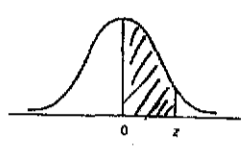
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<p>(2) (7%) In reality, suppose that they'd now got a standard deviation equal to \$1500. Using the sample size you derived in part (1), please find the margin of error. Explain whether and why this margin of error would be less \$100, equal to \$100, or more than \$100.</p> <p>(3) (7%) Refer to part (2). What is the probability that the sample mean falls within \$100 of the population mean? Explain whether and why this probability would be less 0.95, equal to 0.95, or more than 0.95.</p> <p>4. (30%) The following estimated regression equation was developed after 20 fast-food outlets were surveyed,</p> $\hat{y} = 10.1 - 4.2x_1 + 6.8x_2 + 15.3x_3,$ <p>where</p> <p>x_1 = number of competitors within one mile, x_2 = population within one mile (1000s), x_3 = $\begin{cases} 1 & \text{if drive-up window present} \\ 0 & \text{otherwise} \end{cases}$, y = sales (US\$1000s).</p> <p>The following results are also obtained</p> $SS_{Reg} = 250 \text{ and } SS_{Total} = 310.$ <p>(1) (10%) Please complete the ANOVA table for the regression analysis and interpret the resulting table. Make a decision for the model using a 0.05 significance level.</p> <p>(2) (5%) Compute the value of R^2 and interpret it.</p> <p>(3) (5%) Compute the standard error of the regression model and interpret its meaning.</p> <p>(4) (3%) What is the expected amount of sales attributable to the drive-up window?</p> <p>(5) (3%) Predict sales for a store with two competitors, a population of 8000 within one mile, and no drive-up window.</p> <p>(6) (4%) What assumptions must you make for carrying out a linear regression analysis?</p>					
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國立政治大學九十七學年度研究所⁴¹²博士班入學考試命題紙 第三頁，共四頁

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Normal Probabilities



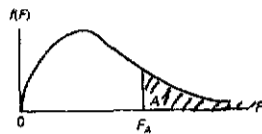
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.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

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Critical Values of F: A = .05



ν_2	ν_1	NUMERATOR DEGREES OF FREEDOM								
		1	2	3	4	5	6	7	8	9
1	1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5
2	1	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38
3	1	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81
4	1	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00
5	1	6.61	5.79	5.41	5.19	5.03	4.95	4.88	4.82	4.77
6	1	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10
7	1	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68
8	1	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39
9	1	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18
10	1	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02
11	1	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90
12	1	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80
13	1	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71
14	1	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65
15	1	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59
16	1	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54
17	1	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49
18	1	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46
19	1	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42
20	1	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39
21	1	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37
22	1	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34
23	1	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32
24	1	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30
25	1	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28
26	1	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27
27	1	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25
28	1	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24
29	1	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22
30	1	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21
40	1	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12
60	1	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04
120	1	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96
8	2	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88

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