

淡江大學 102 學年度日間部轉學生招生考試試題

系別：統計學系三年級

科目：統計學

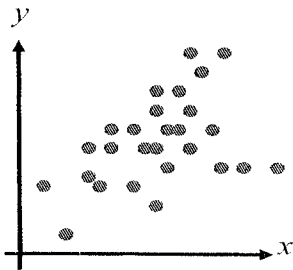
考試日期：7月24日(星期三) 第1節

本試題共 2大題， 4頁

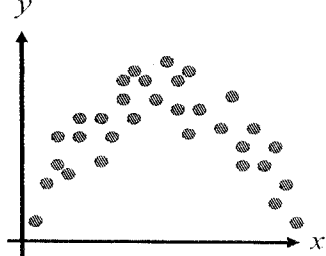
一、Multiple Choice (20%)

1. The following scatter plots show several types of correlation. Which correlation coefficient of the following plots is the largest?

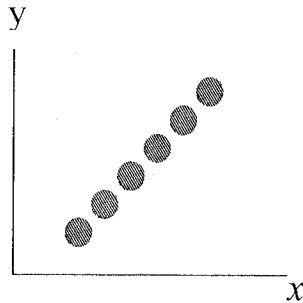
A)



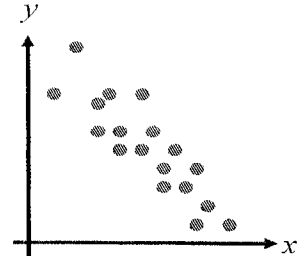
B)



C)



D)



2. What is the median of data in the stem-and-leaf plot?

- A) 73
- B) 72
- C) 74
- D) 77

Key: 3 | 8 = 38

3		8	9										
4		0	2	7									
5		1	1	4	8								
6		3	3	3	8	9	9						
7		0	0	1	1	2	4	7	8	8	8	8	9
8		2	2	3	4	7	7	8	9	9			
9		1	1	4	5	6							

3. A research claims that the mean time for students to earn a Bachelor's degree is 4.3 years. If a hypothesis test is performed with significance level equal to 0.1, how should you make a decision according to the p-value?

- A) reject the claim when p-value < 0.1.
- B) fail to reject the claim when p-value < 0.1.
- C) reject the claim when p-value < 0.05.
- D) fail to reject the claim when p-value < 0.05.

4. According to a survey, the average daily expense for a student of Tamkang University has a mean of \$100 and a variance of \$25. Random samples of 36 students are drawn from this population and the mean of each sample is determined. If \bar{X} represents the random variable of the mean of daily expense of 36 students. Which of the following statements is correct?

- A) $E(\bar{X}) = 4$
- B) $\text{Var}(\bar{X}) = 25$
- C) $E(\bar{X}) = 2.78$
- D) $\text{Var}(\bar{X}) = 0.69$

本試題雙面印刷

淡江大學 102 學年度日間部轉學生招生考試試題

系別：統計學系三年級

科目：統計學

考試日期：7月24日(星期三) 第1節

本試題共 2 大題， 4 頁

二、Answer the following questions

1. (10%) One casino claims the coin used is fair. One customer tosses this coin 1000 times and 520 times are head. Use the hypothesis testing to determine whether the coin is fair or not.

(a)(5%) Identify the type I and type II errors for the hypothesis test of this claim.

(b)(5%) Under significance level $\alpha=0.01$, can we say this coin is fair?

2. (20%) The sample of 10 mileages (in thousands of miles) for a rental car company's fleet are listed.

55 89 73 73 61 76 71 59 55 60

Assume the population of mileages is normally distributed.

(a)(10%) Find a 98% confidence interval for the true mean, μ .

(b)(10%) Find a 98% confidence interval for the variance, σ^2 .

3. (15%) In a study of effectiveness of physical exercise on weight loss, 10 people were randomly selected to participate in a program for 30 days. Their weights **before** the program and **after** the program are listed in the following table. Test the claim that the physical exercise can help people to lose weight. Use $\alpha = 0.01$. Assume that the distribution is normally distributed.

Subject	1	2	3	4	5	6	7	8	9	10
Before	195	225	202	195	175	250	235	268	190	240
After	180	220	210	175	170	250	205	250	190	225

4. (15%) The contingency table shows the number of times a random sample of former smokers tried to quit smoking before they were habit-free and gender. At $\alpha = 0.05$, can you conduct that the number of times they tried to quit before they were habit-free is related to gender?

Gender	Number of times tried to quit before habit-free		
	1	2-3	4 or more
Male	21	36	30
Female	48	26	19

淡江大學 102 學年度日間部轉學生招生考試試題

系別：統計學系三年級

科目：統計學

考試日期：7月24日(星期三) 第1節

本試題共 2 大題， 4 頁

5. (20%) Someone wants to know whether there is a linear relationship between the number of hours a student spent studying for a test and the scores on that test. The data are shown in the following table.

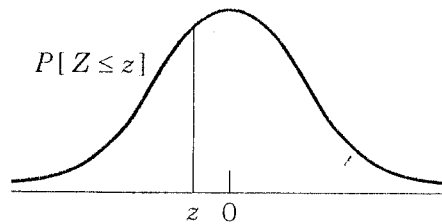
Hours spent studying, x	0	1	2	4	4	5	5	5	6	6	7	7	8
Test score, y	40	41	51	48	64	69	73	75	68	93	84	90	95

The summary results of the data are

$$\sum x_i = 60, \sum y_i = 891, \sum x_i^2 = 346, \sum y_i^2 = 65451, \sum x_i y_i = 4620$$

- (a) (10%) At $\alpha = 0.05$, is there enough evidence to conclude that there is a significant linear correlation between the number of hours a student spent studying for a test and the scores on that test?
- (b) (10%) Find the regression line for the given data.

Standard Normal Probabilities



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.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	.0125	.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	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.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	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.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

淡江大學 102 學年度日間部轉學生招生考試試題

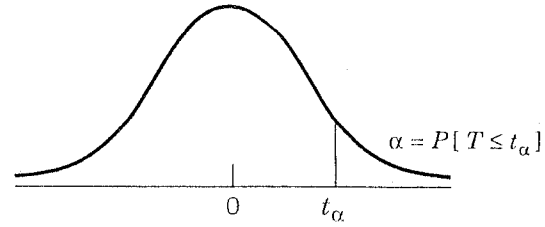
系別：統計學系三年級

科目：統計學

考試日期：7月24日(星期三) 第1節

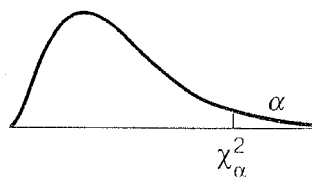
本試題共 2 大題， 4 頁

Percentage Points of t Distributions



d.f. \ α	.25	.10	.05	.025	.01	.00833	.00625	.005
1	1.000	3.078	6.314	12.706	31.821	38.204	50.923	63.657
2	.816	1.886	2.920	4.303	6.965	7.649	8.860	9.925
3	.765	1.638	2.353	3.182	4.541	4.857	5.392	5.841
4	.741	1.533	2.132	2.776	3.747	3.961	4.315	4.604
5	.727	1.476	2.015	2.571	3.365	3.534	3.810	4.032
6	.718	1.440	1.943	2.447	3.143	3.287	3.521	3.707
7	.711	1.415	1.895	2.365	2.998	3.128	3.335	3.499
8	.706	1.397	1.860	2.306	2.896	3.016	3.206	3.355
9	.703	1.383	1.833	2.262	2.821	2.933	3.111	3.250
10	.700	1.372	1.812	2.228	2.764	2.870	3.038	3.169
11	.697	1.363	1.796	2.201	2.718	2.820	2.981	3.106
12	.695	1.356	1.782	2.179	2.681	2.779	2.934	3.055
13	.694	1.350	1.771	2.160	2.650	2.746	2.896	3.012
14	.692	1.345	1.761	2.145	2.624	2.718	2.864	2.977

Percentage Points of χ^2 Distributions



d.f. \ α	.99	.975	.95	.90	.50	.10	.05	.025	.01
1	.0002	.001	.004	.02	.45	2.71	3.84	5.02	6.63
2	.02	.05	.10	.21	1.39	4.61	5.99	7.38	9.21
3	.11	.22	.35	.58	2.37	6.25	7.81	9.35	11.34
4	.30	.48	.71	1.06	3.36	7.78	9.49	11.14	13.28
5	.55	.83	1.15	1.61	4.35	9.24	11.07	12.83	15.09
6	.87	1.24	1.64	2.20	5.35	10.64	12.59	14.45	16.81
7	1.24	1.69	2.17	2.83	6.35	12.02	14.07	16.01	18.48
8	1.65	2.18	2.73	3.49	7.34	13.36	15.51	17.53	20.09
9	2.09	2.70	3.33	4.17	8.34	14.68	16.92	19.02	21.67
10	2.56	3.24	3.94	4.87	9.34	15.99	18.31	20.48	23.21
11	3.05	3.81	4.57	5.58	10.34	17.28	19.68	21.92	24.72
12	3.57	4.40	5.23	6.30	11.34	18.55	21.03	23.34	26.22
13	4.11	5.01	5.89	7.04	12.34	19.81	22.36	24.74	27.69
14	4.66	5.62	6.57	7.79	13.34	21.06	23.68	26.12	29.14
15	5.23	6.26	7.26	8.55	14.34	22.31	25.00	27.49	30.58