系所組別： 經濟學系

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請勿在本試題紙上作答，否則不予計分

Section I: Multiple choice questions (Total grade points for this section is 40; students earn 4 points for each correctly answered question.)

1. Nancy Makso purchased a mailing list of 2,000 names and addresses for her mail order business, but after scanning the list she doubts the authenticity of the list. She randomly selects five names from the list for validation. If 40% of the names on the list are non-authentic, and x is the number of non-authentic names in her sample, P(x=0) is _____.

a) 0.8154; b) 0.0467; c) 0.0778; d) 0.4000; e) 0.5000.

2. A researcher wishes to determine the difference in two population means. To do this, she randomly samples 9 items from each population and computes a 90% confidence interval. The sample from the first population produces a mean of 780 with a standard deviation of 240. The sample from the second population produces a mean of 890 with a standard deviation of 280. Assume that the values are normally distributed in each population. The t value used for this is _____.

a) 1.860 b) 1.734 c) 1.746 d) 1.337 e) 2.342

3. A simple regression model developed for ten pairs of data resulted in a sum of squares of error, SSE = 125. The standard error of the estimate is _____.

a) 12.5; b) 3.5; c) 15.6; d) 3.95; e) 25

4. Fernando Enders, a cost accountant at Ultimate Plastics, Inc. (UPI), is analyzing the manufacturing costs of a molded plastic telephone handset produced by UPI. Fernando's independent variable (y) is production lot size (in 1,000's of units), and his dependent variable (x) is the total cost of the lot (in $100's). Regression analysis of the data yielded the following tables.

	Coefficients	Standard Error	t Statistic	p-value
Intercept	3.996	1.161268	3.441065	0.004885
x	0.358	0.102397	3.496205	0.004413

Source	df	SS	MS	F
Regression	1	9.858769	9.858769	12.22345
Residual	11	8.872	0.806545	
Total	12	18.73077		

$S^e = 0.898$
$R^2 = 0.526341$

The correlation coefficient between Fernando's variables is _____.

a) -0.73; b) 0.73; c) 0.28; d) -0.28; e) 0.00

(背面仍有題目,請繼續作答)

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5. Following the regression in question 4, using $\alpha = 0.05$, Fernando should _____.

a) increase the sample size. b) suspend judgment. c) not reject H_0: $b_1 = 0$.

d) reject H_0: $b_1 = 0$. e) do not reject H_0: $b_0 = 0$.

6. A multiple regression analysis, modeled $y = b_0 + b_1x_1 + b_2x_2 + \varepsilon$, produced the following tables.

Predictor	Coefficients	Standard Error	*t* Statistic	*p*-value
Intercept	624.5369	78.49712	7.956176	6.88E-06
x_1	8.569122	1.652255	5.186319	0.000301
x_2	4.736515	0.699194	6.774248	3.06E-05

Source	df	SS	MS	*F*	*p*-value
Regression	2	1660914	830457.1	58.31956	1.4E-06
Residual	11	156637.5	14239.77		
Total	13	1817552			

These results indicate that _____.

a) none of the predictor variables are significant at the 5% level

b) each predictor variable is significant at the 5% level

c) x_1 is the only predictor variable significant at the 5% level

d) x_2 is the only predictor variable significant at the 5% level

e) the intercept is not significant at 5% level

7. Following question 6, the coefficient of multiple determination is _____.

a) 0.0592 b) 0.9138 c) 0.1149 d) 0.9559 e) 1.0000

8. A researcher believes that a variable is Poisson distributed across six categories. To test this, the following random sample of observations is collected:

Category	0	1	2	3	4	≥5
Observed	47	56	39	22	18	10

Using $\alpha = 0.10$, the observed chi-square value for this goodness-of-fit test is ____.

a) 2.28 b) 14.56 c) 17.43 d) 1.68 e) 2.67

9. A researcher wonders whether an individual's income level influences the grade of gasoline purchased. He collected the following data:

Personal Income	Type of Gasoline		
	Regular	Premium	Extra Premium
Less than $30,000	80	30	30
$30,000 or More	70	40	50

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Using $\alpha = .05$, appropriate decision is _____.

a) reject the null hypothesis and conclude the two variables are not independent

b) reject the null hypothesis and conclude the two variables are independent

c) do not reject the null hypothesis and conclude the two variables are not independent

d) do not reject the null hypothesis and conclude the two variables are independent

e) do nothing

10. Morgan Dubai manages a portfolio of 200 common stocks. He classifies his portfolio stocks by 'industry sector' and 'investment objective.'

Investment Objective	Industry Sector			Total
	Electronics	Airlines	Healthcare	
Growth	84	21	35	140
Income	36	9	15	60
Total	120	30	50	200

Which of the following statements is true?

a) Growth and Healthcare are complementary events.

b) Electronics and Growth are independent.

c) Electronics and Growth are mutually exclusive.

d) Airlines and Healthcare are collectively exhaustive.

e) Electronics and Healthcare are collectively exhaustive.

Section II: Essay and calculations (60 points for this section. The point figure at the end of each question indicates the grade points for that question.)

11. *The Wall Street Journal* reported some interesting statistics on the job market. One statistic is that 40% of all workers say they would change jobs for "slightly higher pay." In addition, 88% of companies say that there is a shortage of qualified job candidates. Suppose 16 workers are randomly selected and asked if they would change jobs for "slightly higher pay." **(15 Points)**

a. What is the probability that three, four, five, or six say yes? **(5 points)**

b. If 13 companies are contacted, what is the probability that exactly 10 say there is a shortage of qualified job candidates? **(5 points)**

c. If 13 companies are contacted, what is the expected number of companies that would say there is a shortage of qualified job candidates? **(5 points)**

12. The hourly wages in a particular industry are normally distributed with mean \$13.20 and standard deviation \$2.50. A company in this industry employs 40 workers, paying them an average of \$12.20 per hour. Can this company be accused of paying substandard wages? Use an $\alpha = 0.01$ level test. **(5 points)**

(背面仍有題目,請繼續作答)

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13. Nutritional information provided by Kentucky Fried Chicken (KFC) claims that each small bag of potato wedges contains 4.8 ounces of food and 280 calories. A sample of ten orders from KFC restaurants in New York and New Jersey averaged 358 calories. **(20 points)**
    a. If the sample standard deviation was $s = 54$, is there sufficient evidence to indicate that the average number of calories in small bags of KFC potato wedges is greater than advertised? Test at the 1 % level of significance. **(5 points)**
    b. Construct a 99% lower confidence bound for the true mean number of calories in small bags of KFC potato wedges. **(5 points)**
    c. On the basis of the bound you obtained in part (b), what would you conclude about the claim that the mean number of calories exceeds 280? How does your conclusion here compare with your conclusion in part (a) where you concluded a formal test of hypothesis? **(10 points)**

14. Studies of the habits of white-tailed deer indicate that these deer live and feed within very limited ranges, approximately 150 to 205 acres. To determine whether the ranges of deer located in two different geographical areas differ, researchers caught, tagged, and fitted 40 deer with small radio transmitters. Several months later, the deer were tracked and identified, and the distance y from the release point was recorded. The mean and standard deviation of the distances from the release point were as given in the accompanying table. **(10 points)**

	Location	
	1	2
Sample size	40	40
Sample Mean (ft)	2980	3205
Sample standard deviation (ft)	1140	963
Population mean	μ_1	μ_2

    a. If you have no preconceived reason for believing that one population mean is larger than the other, what would you choose for your alterative hypothesis? Your null hypothesis? Would your alterative hypothesis implies a one-tailed or a two-tailed test? Explain. **(5 points)**
    b. Do the data provide sufficient evidence to indicate that the mean distances differ for the two geographical locations? Test using $\alpha = 0.10$. **(5 points)**

15. An experimenter has prepared a drug dosage level that she claims will induce sleep for 80% of people suffering from insomnia. After examining the dosage, we feel that her claims regarding the effectiveness of the dosage are inflated. In an attempt to disprove her claim, we administer her prescribed dosage to 20 insomniacs and we observe Y, the number for whom the drug dose induces sleep. We wish to test the hypothesis $H_0 : p = 0.8$ versus the alternative, $H_a : p < 0.8$. Assume that the rejection region $\{y \le 12\}$ is used. **(10 points)**
    a. In terms of this problem, what is a type II error? **(5 points)**
    c. Find β when $p = 0.6$. **(5 points)**

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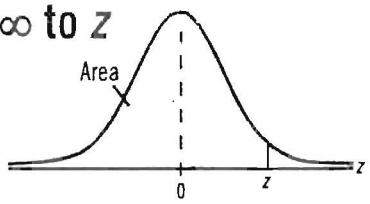
Standard Normal Distribution $-\infty$ to z



Numerical entries represent the probability that a standard normal random variable is between $-\infty$ and z where $z = (x - \mu)/\sigma$.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998

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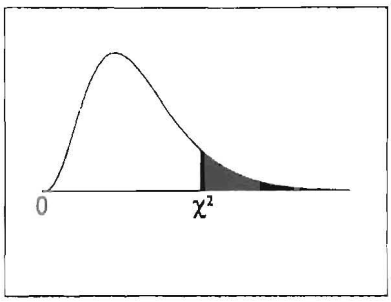
Chi-Square Distribution Table



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

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169