東吳大學 108 學年度碩士班研究生招生考試試題

系級	企業管理學系碩士班 B 組	考試時間	100 分鐘
科目	統計學	本科總分	100 分

1. 請敘述貝氏定理(Bayes' theorem)之概念。(10 分)

2. 請敘述中央極限定理(the central limit theorem)之概念。(10 分)

3. 請敘述型一誤差(Type I error)及型二誤差(Type II error)之概念。(10 分)

4. 請敘述下列在何種情況下: (20 分)
   (一) Binomial Probability Distribution(二項分配)近似 Hypergeometric Probability (超幾何分配)。
   (二) Poisson Probability Distribution 可用來推估 Binomial Probability Distribution(二項分配)。
   (三) Binomial Probability Distribution(二項分配)近似 Normal Probability Distribution(常態分配)。
   (四) t 分配非常近似 Z 分配(標準常態分配)。

5. 請敘述母體平均數(μ)的 95%信賴區間(Confidence Interval)之概念。 (8 分)

6. A university dean is interested in determining the proportion of students who receive some sort of financial aid. Rather than examine the records for all students, the dean randomly selects 200 students and finds that 118 of them are receiving financial aid. If the dean wanted to estimate the proportion of all students receiving financial aid to within 3% with 99% reliability, how many students would need to be sampled? (6 分)

7. A recent study focused on the number of times men and women send a Twitter message in a day. The information is summarized below.(9 分)

	Sample Size	Sample Mean	Population Standard Deviation
Men	25	20	5
Women	30	30	10

1). At the .01 significance level, is there a difference in the mean number of times men and women in a day? What is the test statistic for this hypothesis?
A) z-statistic B) t-statistic C) p-statistic D) df-statistic

2). At the .01 significance level, is there a difference in the mean number of times men and women send a Twitter message in a day? What is the value of the test statistic for this hypothesis test?
A) 2.668 B) 2.672 C) 4.80 D) 2.40

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3). At the .01 significance level, is there a difference in the mean number of times men and women send a Twitter message in a day?

A) Reject the null hypothesis and conclude the means are different.

B) Reject the null hypothesis and conclude the means are the same.

C) Fail to reject the null hypothesis and conclude the means are the same.

D) Fail to reject the null hypothesis and conclude the means are different.

8. An economist is interested to see how consumption for an economy (in $ billions) is influenced by gross domestic product (GDP ; $ billions) and aggregate price (consumer price index). The Microsoft Excel output (TABLE 1) of this regression is partially reproduced below. (18 分)

TABLE 1- SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.991
R Square	0.982
Adjusted R Square	0.976
Standard Error	0.299
Observations	10

ANOVA

	df	SS	MS	*F*	*Signif F*
Regression	2	33.4163	16.7082	186.325	0.0001
Residual	7	0.6277	0.0897		
Total	9	34.0440			

	Coeff	StdError	*t Stat*	*P-value*
Intercept	-0.0861	0.5674	-0.152	0.8837
GDP	0.7654	0.0574	13.340	0.0001
Price	-0.0006	0.0028	?	0.8330

1). Referring to Table 1, to test for the significance of the coefficient on aggregate price index, the value of the relevant *t*-statistic is

A) 2.365. B) 0.143. C) -0.214. D) -1.960.

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2). Referring to Table 1, the *p*-value for GDP is
A) 0.05. B) 0.01. C) 0.001. D) None of the above.

3). Referring to Table 1, the *p*-value for the aggregated price index is
A) 0.05. B) 0.01. C) 0.001. D) None of the above.

4). Referring to Table 1, the *p*-value for the regression model as a whole is
A) 0.05. B) 0.01. C) 0.0001. D) None of the above.

5). Referring to Table 1, what is the predicted consumption level for an economy with GDP equal to $4 billion and an aggregate price index of 150?
A) $1.39 billion B) $2.89 billion C) $4.75 billion D) $9.45 billion

6). Referring to Table 1, one economy in the sample had an aggregate consumption level of $3 billion, a GDP of $3.5 billion, and an aggregate price level of 125. What is the residual for this data point?
A) $2.52 billion B) $0.48 billion C) - $1.33 billion D) - $2.52 billion

9. An airline wants to select a computer software package for its reservation system. Four software packages (1, 2, 3, and 4) are commercially available. The airline will choose the package that bumps as few passengers as possible during a month. An experiment is set up in which each package is used to make reservations for 5 randomly selected weeks. (A total of 20 weeks was included in the experiment.) The number of passengers bumped each week is obtained, which gives rise to the following Excel output (**TABLE 2**): (9 分)

TABLE 2-ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	212.4	3		8.304985	0.001474	3.238867
Within Groups	136.4		8.525			
Total	348.8					

1). Referring to Table 2, the total degrees of freedom is
A) 3 B) 4 C) 16 D) 19

2). Referring to Table 2, the among-group (between-group) mean squares is
A) 8.525 B) 70.8 C) 212.4 D) 637.2

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3). Referring to Table 2, at a significance level of 1%,

A) there is insufficient evidence to conclude that the mean number of customers bumped by the 4 packages are not all the same.

B) there is insufficient evidence to conclude that the mean number of customers bumped by the 4 packages are all the same.

C) there is sufficient evidence to conclude that the mean number of customers bumped by the 4 packages are not all the same.

D) there is sufficient evidence to conclude that the mean number of customers bumped by the 4 packages are all the same.

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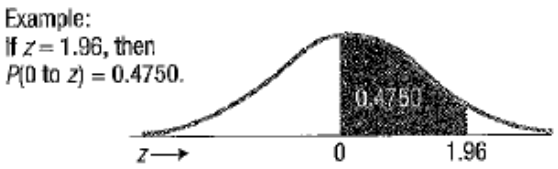

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990