國立臺北商業技術學院 99 學年度研究所碩士班考試入學試題

准考證號碼：□□□□□□（請考生自行填寫）

商研所.財金財管組.商務系碩士班 筆試科目： 統計學 共 6 頁，第 1 頁

注意事項	1. 本科目合計 100 分，答錯不倒扣。 2. 請於答案卷上依序作答，並標註清楚題號（含小題）。 3. 考完請將答案卷及試題一併繳回。

一、True(O) or False(X) Questions: (10 * 4% = 40%)

1. The measure of central tendency which can be used for both numerical and categorical variables is the mode.

2. If two equally likely events A and B are collectively exhaustive, the probability that event A occurs is 0.5.

3. According to a survey of American households, the probability that the residents own 2 cars if annual household income is over $30,000 is 70%. Of the households surveyed, 60% had incomes over $30,000 and 75% had 2 cars. The probability that the residents of a household do not own 2 cars and have an income over $30,000 a year is 0.33.

4. The number of customers arriving at a department store in a 30-minute period has a Poisson distribution.

5. If p remains constant in a binomial distribution, an increase in n will not change the mean.

6. The amount of time necessary for assembly line workers to complete a product is a normal random variable with a mean of 18 minutes and a standard deviation of 3 minutes. So, 95% of the products require more than 12.12 minutes for assembly.

7. As a general rule, one can use the normal distribution to approximate a binomial distribution whenever np and $n(1 - p)$ are at least 5.

8. Sampling error can be completely eliminated by taking larger sample sizes.

9. Other things being equal, as the confidence level for a confidence interval increases, the width of the interval increases.

10. The confidence interval estimate of the population proportion is constructed around the sample proportion.

背面尚有試題

二、**Multiple Choice Questions:** (15 * 4% = 60%)

11. A company has 2 machines that produce widgets. An older machine produces 21% defective widgets, while the new machine produces only 9% defective widgets. In addition, the new machine produces 3 times as many widgets as the older machine does. Given a randomly chosen widget was tested and found to be defective, what is the probability it was produced by the old machine?
(A) 0.5 (B) 0.5625 (C) 0.525 (D) 0.4375 .

12. The standard error of the mean for a sample of 100 is 24. In order to cut the standard error of the mean to 12, we would
(A) increase the sample size to 400.
(B) increase the sample size to 200.
(C) decrease the sample size to 50.
(D) decrease the sample size to 25.

13. The power of a test is measured by its capability of
(A) rejecting a null hypothesis that is true.
(B) not rejecting a null hypothesis that is true.
(C) rejecting a null hypothesis that is false.
(D) not rejecting a null hypothesis that is false.

14. The *t* test for the mean difference between 2 related populations assumes that the:
(A) population sizes are equal.
(B) sample variances are equal.
(C) population of differences is approximately normal or sample sizes are large enough.
(D) All of the above.

15. In a one-way ANOVA, if the computed *F* statistic exceeds the critical *F* value we may
(A) reject H_0 since there is evidence all the means differ.
(B) reject H_0 since there is evidence of a treatment effect.
(C) not reject H_0 since there is no evidence of a difference.
(D) not reject H_0 because a mistake has been made.

背面尚有試題

Exhibit 1：

A drug company is considering marketing a new local anesthetic. The effective time of the anesthetic the drug company is currently producing has a normal distribution with an average of 7.4 minutes with a standard deviation of 1.2 minutes. The chemistry of the new anesthetic is such that the effective time should be normal with the same standard deviation, but the mean effective time may be lower. If it is lower, the drug company will market the new anesthetic; otherwise, they will continue to produce the older one. A sample of size 36 results in a sample mean of 7.1. A hypothesis test will be done to help make the decision.

16. Referring to Exhibit 1, the appropriate hypotheses are:
(A) $H_0 : \mu = 7.4$, $H_1 : \mu \neq 7.4$
(B) $H_0 : \mu \leq 7.4$, $H_1 : \mu \succ 7.4$
(C) $H_0 : \mu \geq 7.4$, $H_1 : \mu \prec 7.4$
(D) $H_0 : \mu \succ 7.4$, $H_1 : \mu \leq 7.4$

17. Referring to Exhibit 1, the p value of the test is:
(A) 0.1336 (B) 0.0668 (C) 0.4332 (D) 0.0334

18. Why would you use the Tukey-Kramer procedure?
(A) To test for normality.
(B) To test for homogeneity of variance.
(C) To test independence of errors.
(D) To test for differences in pairwise means.

19. In a multiple regression problem involving two independent variables, if b1 is computed to be +2.0, it means that
(A) the relationship between $X1$ and Y is significant.
(B) the estimated average of Y increases by 2 units for each increase of 1 unit of $X1$, holding $X2$ constant.
(C) the estimated average of Y increases by 2 units for each increase of 1 unit of $X1$, without regard to $X2$.
(D) the estimated average of Y is 2 when $X1$ equals zero.

背面尚有試題

Exhibit 2：

Many companies use well-known celebrities as spokespersons in their TV advertisements. A study was conducted to determine whether brand awareness of female TV viewers and the gender of the spokesperson are independent. Each in a sample of 300 female TV viewers was asked to identify a product advertised by a celebrity spokesperson. The gender of the spokesperson and whether or not the viewer could identify the product was recorded. The numbers in each category are given below.

	Male Celebrity	Female Celebrity
Identified product	41	61
Could not identify	109	89

20. Referring to Exhibit 2, which test would be used to properly analyze the data in this experiment?
(A) $\chi 2$ test for independence
(B) $\chi 2$ test for differences among more than two proportions
(C) Wilcoxon rank sum test for independent populations
(D) Wilcoxon signed ranks test for two related populations

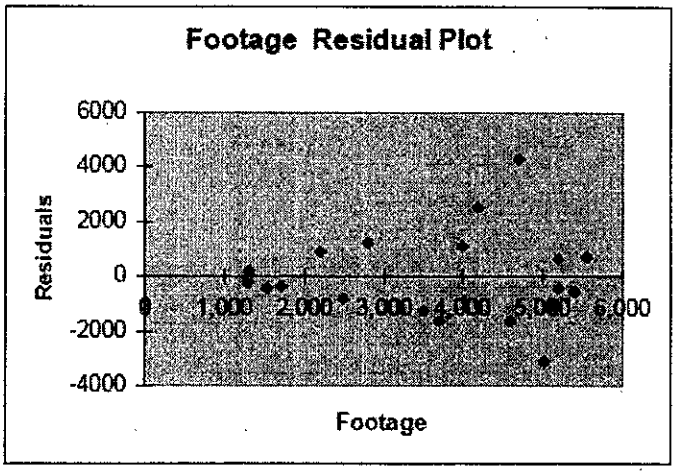
21. Referring to Exhibit 2, the calculated test statistic is
(A) -0.1006 (B) 0.00 (C) 6.1194 (D) 5.9418.

22. In performing a regression analysis, the least squares method minimizes which of the following?
(A) SSR (B) SSE (C) SST (D) All of the above.

23. An automotive engineer would like to be able to predict automobile mileages. She believes that the 2 most important characteristics that affect mileage are horsepower and the number of cylinders (4 or 6) of a car. She believes that the appropriate model is: $Y = 40 - 0.05X1 + 20X2 - 0.1X1X2$
where $X1$ = horsepower
$X2$ = 1 if 4 cylinders, 0 if 6 cylinders
Y = mileage.
The fitted model for predicting mileages for 6-cylinder cars is:
(A) $40 - 0.05X1$
(B) $40 - 0.10X1$
(C) $60 - 0.10X1$
(D) $60 - 0.15X1$

背面尚有試題

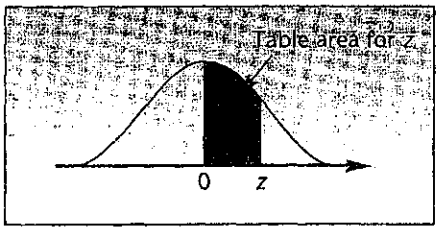
24. In a simple regression problem, based on the residual plot below, you will conclude that there might be a violation of which of the following assumptions.



(A) Linearity of the relationship
(B) Normality of errors
(C) Homoscedasticity
(D) Independence of errors

25. The Variance Inflationary Factor (VIF) measures the
(A) correlation of the X variables with the Y variable.
(B) correlation of the X variables with each other.
(C) contribution of each X variable with the Y variable after all other X variables are included in the model.
(D) standard deviation of the slope.

試題至此結束



The table areas are probabilities that the standard normal random variable is between 0 and z.

	Second Decimal Place in z									
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
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998									
4.0	0.49997									
4.5	0.499997									
5.0	0.4999997									
6.0	0.49999999									