

九十三學年度 科管 系(所) 乙、丙 組碩士班入學考試

科目 統計學 科號 6002 共 4 頁第 1 頁 \*請在試卷【答案卷】內作答  
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可用中文作答。作答時題號請標示清楚。

(1) Describe what happens to the width of a confidence interval estimate of the population mean when each of the following happens. Assume that the population variance is known.

- (3%) (a) The confidence level increases.
- (3%) (b) The sample size decreases.
- (3%) (c) The value of the population variance increases.
- (3%) (d) The value of the sample mean increases.

(2) How large a sample should be taken to estimate a population proportion to within 0.01 with 95% confidence, if the proportion is known to be around 0.45. (5%)

(3) In testing the hypotheses  $H_0: \mu = 15$  vs.  $H_1: \mu \neq 15$ , the following

information were given:  $\sigma = 5$ ,  $n = 16$ ,  $\bar{x} = 17.4$ ,  $\alpha = 0.05$ .

- (3%) (a) Calculate the value of the test statistic.
- (4%) (b) Determine the P-value.
- (3%) (c) Interpret the result.

(4) In testing the hypotheses  $H_0: \mu = 50$  vs.  $H_1: \mu > 50$ , the following

information were given:  $\sigma = 10$ ,  $n = 25$ , and  $\alpha = 0.05$ .

- (5%) (a) Set up the rejection region.
- (5%) (b) When  $\mu = 55$ , calculate  $\beta$ ; the probability of a type II error.
- (5%) (c) Recalculate  $\beta$  if  $\alpha$  is lowered from 0.05 to 0.025.
- (3%) (d) Review the results of part (b) and (c). What is the effect of decreasing the significance level on the value on  $\beta$

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- (5) In a completely randomized design, 12 observations were taken from the first treatment, 15 observations from the second treatment, and 18 observations from the third treatment. A partial ANOVA table is shown below:

Source of variation	d.f.	SS	MS	F
Treatments	<b>a=?</b>	210	<b>b=?</b>	<b>c=?</b>
Error	<b>d=?</b>	<b>e=?</b>	35	
total	<b>f=?</b>	<b>g=?</b>		

(15%) (a) complete the above ANOVA table.

(5%) (b) Test at the 5% significance level to determine if difference exist among the three treatment means.

$$(F_{0.05;2,42} = 3.23, F_{0.05;3,41} = 2.84)$$

- (6) The computer output for the multiple regression model

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \varepsilon$$

is partially shown below.

predictor	Coefficients	St. dev	T-stat
Intercept	<b>a=?</b>	6.15	4.11
$x_1$	3.51	<b>b=?</b>	1.25
$x_2$	-0.71	0.30	<b>c=?</b>

Standard error = **d=?**

R-square = **e=?**

Adjusted R-square = **f=?**

ANOVA

Source of variation	d.f	SS	MS	F
Regression	<b>g=?</b>	412	<b>h=?</b>	<b>i=?</b>
Residue (Error)	37	<b>j=?</b>	<b>k=?</b>	
Total	<b>l=?</b>	967		

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(20%) (a) Fill in the missing values.

(5%) (b) Test the hypotheses

$$H_0 : \beta_1 = \beta_2 = 0$$

$H_1$  : at least one  $\beta_i$  is not equal to zero.

at the 5% significance level.

$$(F_{0.05;2,30} = 3.32, F_{0.05;2,40} = 3.23)$$

- (7) Suppose that a random sample of 60 observations was drawn from a population. After calculating the mean and standard deviation, each observation was standardized and the number of observations in each of the intervals below was counted. Can we infer at the 5% significance level that the data were drawn from a normal population? (10%)

Interval	Frequency
$z \leq -1$	5
$-1 < z \leq 0$	17
$0 < z \leq 1$	30
$z > 1$	8

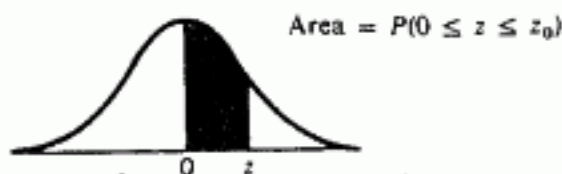
$$(\chi_{0.05;1}^2 = 3.841, \chi_{0.05;2}^2 = 5.991, \chi_{0.05;3}^2 = 7.815)$$

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TABLE 3 Normal Curve Areas



$z_0$	.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