皆試科目:	工程網	統計									考課	胡田期	: 0205,	節次:
<b>第1頁</b> ,共														
※ 考生請	注意:	:本試	題可使	用計算	機。	請於答	案卷(十	₹)作答	,於本	試題紙	我上作答	渚,	不予計	分。
1. Time hea	adway	in traff	ic flow is	the ela	psed tin	ne betwe	en two c	onsecu	tive car	s. Let X	= time h	eadwa	y betwo	en two
randomly	y chos	en car	s. Consid	der the p	probabili	ity densi	ty functio	n of X a	s follow	vs. (5 pc	ints eacl	h)	-	
				ſ	¢.									
			f	$(x) = \begin{cases} \frac{1}{x} \\ 0 \end{cases}$	<u>4</u> . x	.>1								
				[0	x	:≤1		(						•
(1) Det	ermine	the va	alue of k	for whic	h f(x) is	a legitim	nate pdf.							
(2) Obt	ain the	cumu	lative dis	stributior	n functio	n.								
(3) Use	the co	lf from	(2) to de	etermine	the pro	bability	hat head	lway ex	ceeds 2	2 sec an	d also th	e prob	ability t	hat
				1.0										
hea	dway i	s betw	reen 2 ar	nd 3 sec	•									
<ul><li>(4) Obta</li><li>Test resu treatment</li></ul>	ain the Ilts rep t grouj	mean orted o o, each	value of on an exp n consisti	f headwa perimen ing of 60	ay and t t in whic ) specim	ch 120 s iens. Th	e sample	vere rar mean s	domly strength	divided i n (MPa)	and sam	ple sta	indard o	deviatio
<ul> <li>(4) Obtain</li> <li>Test results</li> <li>treatment</li> <li>for the treatment</li> <li>15.8. (5 pressure)</li> <li>(1) Cate</li> </ul>	ain the Its rep t group eatmen points o Iculate	orted o o, each nt grou each) e a poir	value of on an exp n consisti p were 1 nt estima	f headwa perimen ing of 60 i9.9 and ite for th	ay and t It in whic Specim 39.1, re e differe	ch 120 s nens. Th espective ence bet	amples v e sample ely, where ween true	vere rar mean s eas the e streng	idomly strength se value th for th	divided i n (MPa) es for th ne treatr	and sam e control nent and	ple sta group	were 1	deviatio 3.7 and os.
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## 國立成功大學 107 學年度碩士班招生考試試題

系 所:土木工程學系

考試科目:工程統計

編號: 107

考試日期:0205,節次:3

- 4. Two materials (i.e., X and Y) were tested for their tensile strength for construction work. We would like to explain the behavior of the Y material as a linear function of the X material. A total of 10 pairs of specimens were randomly collected and tested. For the data, X̄ = 75, Ȳ = 80; S<sub>XX</sub> = ∑(X X̄)<sup>2</sup> = 400; S<sub>YY</sub> = ∑(Y Ȳ)<sup>2</sup> = 600 and S<sub>XY</sub> = ∑(X X̄)(Y Ȳ) = 300. (5 points each)
  - (1) State the assumptions of the linear regression model.
  - (2) Estimate the slope and intercept from a simple linear regression analysis of these data.
  - (3) Complete the ANOVA table for this regression model
  - (4) Calculate an estimate of MSE.
  - (5) Using the ANOVA table, make your conclusion. Make sure to include in your answer the null and alternative hypotheses.
  - (6) Calculate the coefficient of determination for the model.
  - (7) Interpret this coefficient of determination in the context of the problem.
- 5. Find the best answer for each question. (5 points each)
  - (1) Suppose that  $\overline{x} \sim N(3, 2.5^2)$  and  $\overline{y} \sim N(4, 3.5^2)$ . Suppose further that  $\overline{x}$  and  $\overline{y}$  are independent. Find the distribution of the difference  $\overline{y} \overline{x}$ . (a)  $N(1, 4.3^2)$  (b)  $N(1, 2.45^2)$  (c)  $N(1, 18.5^2)$  (d)  $N(-1, 1^2)$  (e)  $N(-1, 6^2)$ .
  - (2) What is the confidence level for the interval  $\bar{x} \pm 1.64 \cdot \frac{\sigma}{\sqrt{n}}$ ? (a) 0.80, (b) 0.85, (c) 0.90, (d) 0.95, (e) 0.99.
  - (3) Which of the following is not a valid null hypothesis? (a)  $\mu \ge 5$ , (b)  $\sigma = 0.3$ , (c)  $\mu_1 \mu_2 \le -1$ , (d)  $\mu < 0.2$ , (e)  $\sigma_1 / \sigma_2 = 1$ .
  - (4) Suppose we created a 95% confidence interval for mean length of time waiting for the bus of (3.12, 8.54) minutes, from our sample mean wait time of 5.83 minutes. Which of the following statements is true? (a) 95% of the time, the true mean µ length of time spent waiting for the bus will fall in the interval I selected above. (b) If I were to repeat the study by keeping track of how long I wait for the bus multiple semesters, about 95% of the time, I would capture the true mean length of time spent waiting for the bus. (c) The probability that the interval I selected above contains 5.83 is 0.95. (d) About 95% of the confidence intervals that I create will contain the mean 5.83 minutes. (e) The probability that the interval I selected above contains the true mean wait time for the bus is 0.95.
  - (5) The following 95% simultaneous confidence intervals (CI) are obtained on the 4 different temperatures in an experiment. Which of the following four statements do you think describes the relationship between μ<sub>1</sub>, μ<sub>2</sub>, μ<sub>3</sub>, and μ<sub>4</sub>? (a) μ<sub>3</sub>=μ<sub>4</sub>, μ<sub>1</sub> and μ<sub>2</sub> differ from μ<sub>3</sub> and μ<sub>4</sub>. (b) μ<sub>1</sub>=μ<sub>2</sub>=μ<sub>3</sub>, and μ<sub>4</sub> differs from μ<sub>1</sub>, μ<sub>2</sub>, and μ<sub>3</sub>. (c) μ<sub>2</sub>=μ<sub>4</sub>. μ<sub>2</sub> and μ<sub>4</sub> differ from μ<sub>1</sub> and μ<sub>3</sub>. (d) μ<sub>1</sub>=μ<sub>3</sub>=μ<sub>4</sub>, and μ<sub>2</sub> differs from μ<sub>1</sub>, μ<sub>3</sub>, and μ<sub>4</sub>. (e) All four μ's are different from one another.

Difference	μ <sub>1</sub> - μ <sub>2</sub>	μ <sub>1</sub> - μ <sub>3</sub>	μ1- μ4	μ2- μ3	μ <sub>2</sub> - μ <sub>4</sub>	μ3- μ4
СІ	(-0.5,-0.1)	(-0.3,-0.2)	(0.2, 0.5)	(0.1, 0.5)	(-0.1, -0.4)	(0.2, 0.4)