## 國立中央大學97學年度碩士班考試入學試題卷

## 所別:企業管理學系碩士班 (丙、丁、辛組) 科目:統計學 共 / 頁 第 / 頁

\*請在試卷答案卷(卡)內作答

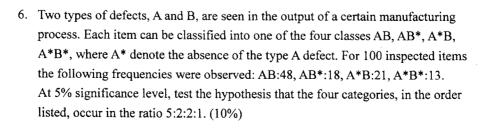
1. An industry, in deciding whether to purchase a machine of design A or design B, checks the times for completing a certain task on each machine. Eight technicians were used in the experiment, with each technician using both machine A and machine B in a randomized order. The times (in seconds) to completion of the task are given in the accompanying table.

Technician	1	2	3	4	5	6	7	8
A	32	40	42	26	35	29	45	22
В	30	39	42	23	36	27	41	21

- (1) Do you think blocking on technician was worthwhile in this case? Explain. (5%)
- (2) Test to see there is a significant blocking effect at the 5% significance level. (20%)
- 2. Suppose the relationship between applied stress x and time-to-failure Y is described by the simple linear regression model with true regression line E(y) = 100 3.92x and  $\sigma^2 = 2$ . Let Y1 denotes an observation on time-to-failure made with x=15 and Y2 denotes an independent observation made with x=14, find the probability that Y1 exceed Y2, i.e.,  $P\{Y1 > Y2\} = ?(15\%)$
- 3. Consider the linear regression model  $Y_i = b_0 + b_1 x_{1i} + b_2 x_{2i} + \varepsilon_i$  i=1, 2, ..., n Suppose we have the estimates  $\overline{Y} = 10$ ,  $s_y^2 = 4$ ,  $\overline{x}_1 = 2$ ,  $s_{x1}^2 = 1$ ,  $\hat{b}_1 = 1.4$ , n=20, then determine the *beta coefficient* of  $x_1$  and explain its meaning. (15%)
- 4. As the items come to the end of production line, an inspector chooses which items are to go through a complete inspection. Ten percent of all items produced are defective. Sixty percent of all defective items go through a complete inspection, and 20% of all good items go through a complete inspection. Given that an item is completely inspected, what is the probability it is defective? (15%)
- 5. Consider the summary data of three treatments as following table:

Treatment	$n_{i}$	$\vec{x}_i$	$S_i$
1	10	4	1.0
2	10	6	1.5
3	10	2	0.5

Compute a 95% confidence interval for  $\frac{1}{2}(\mu_1 + \mu_2) - \mu_3$  (20%)





Normal distribution  $P(Z \le 1.645) = 0.95$   $P(Z \le 1.96) = 0.975$  F distribution  $F_{7,7,0.05} = 3.79$ ,  $F_{7,8,0.05} = 3.50$ 

Chi-square distribution  $\chi^2_{3,0.05} = 7.814$ ,  $\chi^2_{4,0.05} = 9.487$  t distribution  $t_{27,0.025} = 2.052$ ,  $t_{27,0.05} = 1.703$ ,  $t_{30,0.025} = 2.042$ ,  $t_{30,0.05} = 1.697$