

國立高雄應用科技大學
九十七學年度碩士班招生考試
工業工程與管理系（甲組）

准考證號碼 （考生必須填寫）

統計學

試題 共 2 頁，第 1 頁

- 注意：a. 本試題共 4 題，分別為 20、30、30 及 20 分，共 100 分。
b. 作答時不必抄題。
c. 考生作答前請詳閱答案卷之考生注意事項。

1. Assume that the probability mass function of X is given in the following table

x	0	1	4	9
$f(x)$	0.2	0.4	0.3	0.1

- (a) Find the moment generating function of X . [10%]
(b) Find the variance of X from (a). [10%]

2. Let the independent random variables X_1, X_2 have probability density function $f(x_i)$ given by

$$f(x_i) = \frac{1}{x_i^2} I_{(1, \infty)}(x_i), \text{ for } i = 1, 2$$

where $I_A(x)$ is the indicator function on A . Find the distribution of the random variable

$$X = \frac{x_1}{x_2}. \text{ [30%]}$$

3. Let x_1, \dots, x_n be a random sample from $f(x; \theta) = \frac{1}{2} e^{-|x-\theta|}$, $-\infty < \theta < \infty$. Find a maximum-likelihood estimator of θ . [30%]

4. Given below are six observations collected in a regression study on two variables: X (independent variable) and Y (dependent variable).

X	8	11	10	6	6	5
Y	0.6	1.2	1	0.7	0.4	0.3

Consider the linear model $y_j = \beta_1\alpha + \beta_2x_j + \varepsilon_j$, $j = 1, 2, \dots, 6$.

(1) Test the null hypothesis $\beta_1 = 0$ and $\beta_2 = 0$, at the $\alpha = 0.05$ significance level.

[10%]

(2) Test the null hypothesis $\beta_2 = 0$, at the $\alpha = 0.05$ significance level. [10%]

Some critical values for the F -distribution (F) and Normal distribution (Z).

(1) The following quantities are the numbers x for which $P(F_{a,b} \leq x) = \gamma$:

$$F_{1,4,0.95} = 7.71 \text{ 、 } F_{1,4,0.975} = 12.22 \text{ 、 } F_{2,4,0.95} = 6.94 \text{ 、 } F_{2,4,0.975} = 10.65 \text{ 、 } F_{2,5,0.95} = 5.79 \text{ 、}$$

$$F_{2,5,0.975} = 8.43 \text{ 、 } F_{3,4,0.95} = 6.59 \text{ 、 } F_{3,4,0.975} = 9.98 \text{ 、 } F_{3,5,0.95} = 5.41 \text{ 、 } F_{3,5,0.975} = 7.76$$

(2) The following quantities are the numbers x for which $P(Z \leq x) = \gamma$:

$$Z_{0.9} = 1.282 \text{ 、 } Z_{0.95} = 1.645 \text{ 、 } Z_{0.975} = 1.96$$