

國立嘉義大學九十六學年度

運輸與物流工程研究所碩士班招生考試試題

科目：統計學

(※可使用計算機)

1. In a particular occupation, a random sample of 70 men found that 23 smoked. In a random sample of 90 women, 21 smoked. Are the percents of men and women in this occupation who smoke significantly different? Formulate the null and alternative hypotheses to evaluate the difference. Complete the test and give the p -value of the test statistics. Be sure to state your conclusion. (20%)

2. A retailer of satellite dishes would like to know the impact of advertising on her sales. For 8 months she records the number of ads run in the newspaper and the number of sales: (30%)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Number of ads	0	3	5	8	9	10	7	8
Number of sales	4	7	13	17	18	20	15	16

- a. Examine the scatter plot. Does there appear to be a linear trend in the data? (5%)
- b. Calculate and **interpret** the estimates of β_0 and β_1 for the linear model $y = \beta_0 + \beta_1x + \varepsilon$. (14%)
- c. What is the value of the coefficient of determination? (7%)
- d. What can you say about the number of sales if the retailer runs 30 ads? (4%)

3. Two random variables X and Y have a joint probability density function of the form

$$f_{XY}(x, y) = \begin{cases} a(x + y + xy), & 0 \leq x \leq 2, 0 \leq y \leq 2, \\ 0, & \text{elsewhere} \end{cases}$$

- a. Find the value of a. (10%)
- b. Find the marginal probability density functions $f_X(x)$ and $f_Y(y)$. (10%)
- c. Find the conditional probability density functions $f(x/y)$ and $f(y/x)$. (5%)
- d. Are X and Y independent? (5%)
4. Suppose a store sells sweaters and coats. Each customer who enters the store will only purchase a sweater with probability 0.3. Suppose the number of customers entering the store is Poisson distributed with mean 10.
- a. What is the probability that the store does not sell any sweaters? (10%)
- b. What is the probability that the store exactly sells 2 sweaters? (10%)