

科目：統計學

系所組：應用統計碩士班

1. The joint probability distribution of X and Y is shown in the following table, where X denotes (代表) the number of cats that Mike may have next year, and Y denotes the number of cats that John may have next year.

		X	
Y	1	2	
1	0.4	0.1	
2	0.3	0.2	

- (a) Calculate $E(XY)$. (10%)
 (b) Determine the marginal probability distributions of X and Y . (8%)

2. A recent survey revealed (顯示) that 60% of the vehicles (汽車) traveling on highways, where speed limits (限速) are 90 kilometers per hour, were exceeding the limit (超過規定速度). Suppose you randomly record the speeds of ten vehicles traveling on highways where the speed limit is 90 kilometers per hour. Let X denote the number of vehicles that were exceeding the limit.

- (a) What is the distribution of X ? Why? (8%)
 (b) Find the expected number of vehicles that are traveling on highways and exceeding the speed limit. (5%)
 (c) Find the standard deviation of number of vehicles that are traveling on highways and exceeding the speed limit. (5%)

3. Suppose that the starting salaries of female workers (女性員工) have a distribution with mean of \$56,000 and a standard deviation of \$12,000. The starting salaries of male workers (男性員工) have a distribution with a mean of \$50,000 and a standard deviation of \$10,000. A random sample of 50 female workers and a random sample of 40 male workers are selected.

- (a) What is the sampling distribution of the sample mean difference $\bar{X}_1 - \bar{X}_2$? Explain (解釋). (8%)
 (b) Find the standard error of the sample mean difference. (6%)

4.

- (a) Write a simple linear regression model. (6%)
 (b) What is meant by "least squared estimates (LSE)"? (說明LSE 之作用) (6%)
 (c) For the regression methods to be valid some conditions for the error variable (ε) must be met. List those conditions. (4%)

5. Answer the following questions.

- (a) Explain the meaning of "Statistical Inference". (8%)
 (b) Explain the meaning of "Unbiased Estimator". (8%)
 (c) What is the purpose (目的) of using covariance and coefficient of correlation? Which measurement is better? State your reasons. (8%)
 (d) The outcomes must be mutually exclusive for a sample space. Using tossing a die as an example (以擲骰子為例) to explain (解釋) the meaning of: (1) a sample space and (2) mutually exclusive? (10%)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部份可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。