元智大學 101 學年度研究所 **碩士班** 招生試題卷

系(所)別：資訊管理學系碩士班　組別：資管組A　科目：統計學　

●不可使用電子計算機

無計算或無說明過程 不予計分

1. Please state the definition for the following terms:
   (a) Sample space (4%). (b) Event (4%). (c) Random Variable (4%).
2. In answering a question on a multiple choice test, John either knows the answer or he guesses. Let p be the probability that John knows the answer and $1-p$ the probability that he guesses. Assume that John who guesses at the answer will be correct with probability $1/m$. What is the conditional probability that John knew the answer to a question given that he answered it correctly? (8%)
3. Compute the expectation (expected value) of a Poisson random variable with parameter λ. (8%)
4. Suppose the random variable X can assume only the values 1, 2, 3, 4, and 5, each with probability 0.2. Let $Y=X^2$. Compute the coefficient of correlation between X and Y. (8%)
5. Mary is designing a study concerning the weight of college students. She wants to determine the appropriate number of students she should sample for the study. Mary feels she can tolerate a 0.2 deviation between the sample mean and the true mean. She is willing to take a risk of 0.05. And past research has reported a standard deviation that is approximately 0.6. How many subjects should Mary sample? (8%)
6. John has collected n pairs (x_i, y_i) of real data to develop a linear regression line $y=a+bx$. Now he intends to use the same data to develop another regression line of the form $y=\alpha\bullet\beta^x$. Please explain how you can use the linear regression technique to obtain α and β. (12%)
7. The following table shows the distribution of the daily number of power failures reported in Taiwan on n days, where $\sum_{i=0}^{4} n_i = n$. Please describe how you test at the significance level α whether the daily power failures in Taiwan may be regarded as a Poisson random variable. (12%)

Number of failures	0	1	2	3	4
Number of days	n_0	n_1	n_2	n_3	n_4

8. If s^2 is the variance of a random sample of size n taken from a normal distribution having the variance, Please show how you determine the $1-\alpha$ confidence interval for σ^2. (12%)
9. Suppose that an experimenter has available the results of k independent random samples, each of size n, from k different populations. We are concerned with testing the hypothesis that the means of these k populations are all equal. Let y_{ij} denote the jth observation in the ith sample, $\bar{y}_i$ denote the mean of the ith sample, and $\bar{y}$ denote the overall mean of all observations.
   (a) Show that $\sum_{i=1}^{k}\sum_{j=1}^{n}(y_{ij}-\bar{y})^2=\sum_{i=1}^{k}\sum_{j=1}^{n}(y_{ij}-\bar{y}_i)^2+n\bullet\sum_{i=1}^{k}(\bar{y}_i-\bar{y})^2$ (10%)
   (b) Please describe step-by-step how you test the hypothesis at the significance level α. (10%)

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   (b) Please describe step-by-step how you test the hypothesis at the significance level α. (10%)