| 考 試 科 目 | 統計學 41873 | 系 所 別 | 風險管理與保險學系/ 管理組 | 考 試 時 間 | 2 月 18 日（六）第 3 節 |

1. A pack of cards contains 5 green and 3 red cards respectively. One of the cards will be randomly drawn and when it is put back 2 additional cards of the same color are put in with it. What is the probability that the first card drawn was green given that the second card drawn was red? (10%)

2. A hospital conducts a clinical trial to test whether or not a new drug is effective. Forty-six patients take this drug and are seen 3 days later, at which time 6 of the patients still do not recover from their illness. ($z_{0.95}$= 1.645; $z_{0.975}$= 1.96; $z_{0.9901}$= 2.33)

   (1) What is a 95% confidence interval for the probability of a failure with the drug? (10%)

   (2) Suppose another drug has a 5% failure rate. Can a conclusion be drawn concerning the comparison of effectiveness of these two drugs? (10%)

3. Suppose you are investigating whether eating food A increases the probability of being infected with disease B. A group of 1,000 people is identified and followed for 10 years. After these years, 20 new cases of disease B have occurred. Assume that the incidence rate of this disease over this period for an average person is 0.007. Please test the hypothesis that eating food A increases the risk of disease B at the 5% significant level. (10%)　($z_{0.95}$= 1.645; $z_{0.975}$= 1.96; $z_{0.9901}$= 2.33)

4. The data on the marks of three groups of students are as follows. Group A: mean= 55, standard deviation = 9, number of students = 10; Group A: mean= 56, standard deviation = 16, number of students = 10; Group A: mean= 74, standard deviation = 16, number of students = 10. Assume the underlying variances of these three groups of students are equal.

   (1) Use a one-way ANOVA to compare the underlying means of these three groups of students at the 5% significant level. ($F_{2, 30, .95}$= 3.32; $F_{2, 20, .95}$= 3.49) (10%)

   (2) Use the t-test methodology to compare the underlying means of each specific pair of groups at the 5% significant level. ($t_{27, .95}$= 1.703) (15%)

5. Define the following terms:

   (1) Unbiased estimator (5%)

   (2) Standard error (5%)

   (3) Coefficient of determination (5%)

6. Suppose both T_1 and T_2 are independent and random variables that follow exponential distribution with rate μ. Let $T_{(1)}$ = minimum (T_1, T_2) and $T_{(2)}$ = maximum (T_1, T_2).

   (1) Find E[$T_{(1)}$]　　(10%)

   (2) Find Var[$T_{(2)}$]　　(10%)

| 備　　　　　　註 | 一、作答於試題上者，不予計分。 二、試題請隨卷繳交。 |