國立嘉義大學九十七學年度

運輸與物流工程研究所碩士班招生考試試題

科目：統計學　　　　　說明：可使用計算機。

1. Let the joint p.m.f. (probability mass function) of W and Z be defined by

   $f(w, z) = \alpha(w + z)/75, \ w = 1, 2, 3, 4, 5, \ z = 1, 2, 3.$

   a. Find the value of α.　(10%)

   b. Find the p.m.f. of W.　(10%)

   c. Find the condition p.m.f. of Z when W= 1. (5%)

2. In a championship series, the team which wins five games out of nine will be the winner. Suppose that team A has probability 0.6 of winning over the team B and both teams A and B face each other in the championship games.

   a. What is the probability that team A will win the series in seven games? (10%)

   b. What is the probability that team A will be the winner in the playoff series? (10%)

   c. If both teams face each other in a playoff series and the winner is decided by winning three out of five games, what is the probability that team A will be the winner in the playoff series? (5%)

3. In an attempt to cut down traffic through the city. A free shuttle service from suburban areas to the downtown area was provided. At the beginning very few people took advantage of the shuttle service, but by the end of 1 year, a decision had to be made whether to add more shuttles. Here are the numbers of people who rode on the shuttle and the numbers of automobiles in the downtown area on 6 different occasions throughout the year: (25%)

No. of people using shuttle	420	620	850	1130	1380	1260
No. of autos downtown	2280	2010	1820	1560	1250	1380

   a. If a linear regression model is applied, which variable is the dependent variable? (3%)

   b. Calculate and **<u>interpret</u>** the least square estimates of β_0 and β_1 for the linear model $y = \beta_0 + \beta_1 x + \varepsilon$. (12%)

   c. Calculate and **<u>interpret</u>** the coefficient of determination (i.e., r^2) for this data set. (6%)

   d. Would this model be useful in predicting the number of automobiles in the downtown area if 3000 people ride the shuttle? Explain. (4%)

4. Ships arrive at a port in accordance with a Poisson probability distribution. On the average, there are 2 ships in port. (25%)

   a. Determine the percentage of time during the year that there will be 0 ship present? (5%)

   b. Suppose that on the average it costs $2000/day for a ship to wait for a berth. What would be the annual costs of waiting for a port that has 5 berths? (10%)

   c. Suppose that the cost of an idle berth is $600/day. What would be the annual costs of idle berth time at a port that has 5 berths? (10%)