國立嘉義大學 107 學年度

應用數學系碩士班（乙組）招生考試試題

科目：機率統計

一、機率部分：(50 分)

1. A biased coin is tossed till a head appears for the first time. What is the probability that the number of required tossed is odd? (10 points)

2. Show that $P(AB|C) = P(A|BC)P(B|C)$. (10 points)

3. A random variable X has this probability distribution:

x	0	1	2	3	4	5
$P(x)$	0.1	0.3	0.4	0.1	?	0.05

(a) Find $P(4)$. (5 points)

(b) Find μ and σ^2. (5 points)

(c) What is the probability that x is greater than 2? (5 points)

4. Let X be a random variable and let $g(x)$ be a nonnegative function. For any $r > 0$, then show that $P(g(x) \geq r) \leq \frac{E(g(x))}{r}$. (15 points)

二、統計部分：(50 分)

$Z_{0.05} = 1.65, Z_{0.025} = 1.96, \chi^2_{0.05,5} = 11.07, \chi^2_{0.05,6} = 12.59, \chi^2_{0.05,7} = 14.07$

1. A dice is thrown 90 times. Different faces occurred 11, 17, 20, 15, 13, 14 times, respectively. Test whether the dice is balanced. (10 points)

2. Two random samples of 8 and 11 plots are chosen independently from two distant places. The yields of maize obtained from these plots are given below. Test whether the average maize yield is same for two places. (15 points)

First place: 12, 15, 16, 11, 13, 13, 14, 15

Second place: 15, 22, 12, 25, 18, 19, 20, 17, 25, 24, 18

3. Write True or False for each of the following: (10 points)

(a) Level of significance means rejecting a true null hypothesis.

(b) In hypothesis testing, error is always committed.

(c) Accepting a false null hypothesis is type II error.

(d) In hypothesis testing type I error is always committed.

4. Marks obtained by 12 students in first pre-final examination (x) and second pre-final examination (y) are given below.

x: 12.0, 14.0, 9.5, 10.5, 8.0, 11.5, 10.0, 14.0, 8.0, 9.5, 11.0, 12.0

y: 11.5, 13.5, 12.0, 14.0, 7.0, 14.0, 8.0, 12.5, 6.5, 10.0, 9.0, 12.0

where $\sum x = 130$, $\sum y = 130$, $\sum x^2 = 1452$, $\sum y^2 = 1487$, $\sum xy = 1450$.

(a) Calculate correlation coefficient between x and y. (5 points)

(b) Test whether the population correlation coefficient is significant. (5 points)

(c) Test whether the population correlation coefficient is greater than 0.5. (5 points)