※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (20%)

Let Y be a continuous random variable which is uniformly distributed on $[c, d]$.

Determine (a) (10%) Expectation of Y; and (b) (10%) Variance of Y.

2. (20%)

Given $P(A|B) = p$, $P(A) = q$, and $P(B) = r$, where $0 < p \neq q \neq r < 1$.

Determine (a) (10%) $P(B|A)$; and (b) (10%) Are the events A and B independent?

3. (20%)

Given a joint probability mass function $f(x, y) = c(x + y)$, $x = 1, 2, 3$ and $y = 1, 2$.

Determine (a) (10%) the value of c; and (b) (10%) $E(X)$.

4. (20%)

The probability that the maximum flood exceeds a warning level in any year is q. If the floods events are independent, determine (a) (10%) the probability that the maximum flood exceeds the warning level exactly twice in a 5-year period; and (b) (10%) the probability that the maximum flood exceed the warning level at least two times in a 5-year period.

5. (20%)

If the n paired observed data (x_1, y_1), (x_2, y_2), ..., (x_n, y_n) show a linear relationship and the linear model $Y = a + bX$ is used to model this linear relationship, determine the values of a and b in terms of these observed data.