
COLLEGE OF ARTS, MEDIA AND TECHNOLOGY
CHIANG MAI UNIVERSITY

Mathematics for DII

Examination 3

Summer Semester 2021

Part I: Please answer the following problems. Unless otherwise specified, you may use any valid method to solve a problem.

Problem 1. (6 Pts.) *Counting*

Please answer the followings:

- (a) How many different words (bit strings) are there for six-bit word?
- (b) How many unique ways are there to arrange the letters in the word "SONG"?
- (c) How many unique ways are there to arrange the letters in the word "PRIOR"?

Problem 2. (4 Pts.) *Counting*

A student is to answer 7 out of 10 questions in an examination.

- (a) (2 Pts.) How many choices does he have?
- (b) (2 Pts.) How many if he must answer at least 3 of the first 5 questions?

Problem 3. (8 Pts.) *Counting*

Consider three classes, each consisting of 3 students. From this group of 9 students, a group of 3 students is to be chosen.

- (a) (2 Pts.) How many choices are possible?
- (b) (2 Pts.) How many choices are there in which all 3 students are in the same class?
- (c) (2 Pts.) How many choices are there in which 2 of the 3 students are in the same class and the other student is in a different class?
- (d) (2 Pts.) How many choices are there in which all 3 students are in different classes?

Problem 4. (6 Pts.) *Counting*

Please answer the followings:

- (a) (2 Pts.) What is the coefficient of the term containing x^4y^6 of $(2x + y)^{10}$?
- (b) (2 Pts.) What is the coefficient of the term containing $x^{16}y^6$ of $(2x^3 + y^2)^9$?
- (c) (2 Pts.) What is the coefficient of the term containing x^3y^2 of $(2x^3 + y^2)^5$?

Problem 5. (8 Pts.) *Probability*

Suppose that you roll a pair of fair 6-sided dice. Let A be the event that the first die is 1, and B be the event that the sum of the two dice is 3. Use the sample space of possible outcomes below to answer each of the following questions.

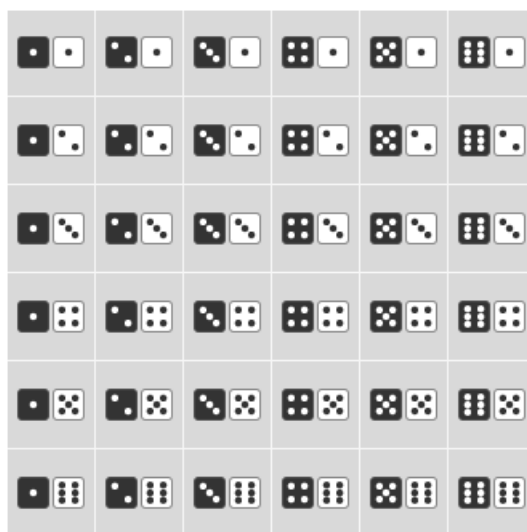


Figure 1: Possible outcomes.

- (a) What is $P(A)$, the probability that the first die is 1?
- (b) What is $P(B)$, the probability that the sum of the two dice is 3?
- (c) What is $P(A|B)$, the probability that the first die is 1, given that the sum of the two dice is 3?
- (d) What is $P(AB)$ the probability that the first die is 1 and the sum of the two dice is 3?

Problem 6. (6 Pts.) *Probability*

An urn contains two A-type coins and three B-type coins. When A-type coin is flipped, it comes up heads with probability $1/4$, whereas when a B-type coin is flipped, it comes up heads with probability $3/4$. If a coin is randomly chosen from the urn and flipped.

- (a) (2 Pts.) What is the probability that the selected coin is the A-type coin?
- (b) (2 Pts.) What is the probability that it comes up tails?
- (c) (2 Pts.) Given that the flip landed on heads, what is the probability that it was a B-type coin?