Week 2

Table of Contents

Day 2

Counting Techniques

(The   Rule [Fundamental Counting Principle])

- First stage =   & Second stage =
-    ways to accomplish an experiment

(Extended   Rule)

-   stages with   ways for the first stage,   ways for the second stage, and   ways to for the   stage
-

Permutation

Arrangement of Objects

(Distinct Permutation)

- Permutation of   objects is

- Permutation of   objects   at a time

  _____

- Note that

(Repeating Permutation)

- Permutation of   objects with   types

  _____

(Circular Permutation)

- Permutation in a circle with one fixed object is

Combination

- Counting without arrangement

  _____

Probability

(Uniform Probability Model)

  _____

  ____

- In cases where out comes are <u>not equally likely to occur</u>:

- Note that:
  1.
  2.
  3.
- Union and Intersection

- Note the **Addition Rule**

- Compliment $\longrightarrow$

Conditional Probability

(Dependent Events)

- An event occurring affects the probability of the following event
- Probability of   given event   has occurred

- Note the **Multiplication Rule**

(Independent Events)

- Probability of one does not affect the other
- Independent if

- Mutual Independence
  - Events   are mutually independent if each pair of
  events   and   are independent.

Day 3

Probability Distribution

- A formula, table, or graph that gives all the possible values
  of the discrete random variable , and the probability
              associated with each value

-

-

(Example)
Toss two fair coins and let   be the number of heads observed. Find
the probability distribution for   .

Simple Event	Coin 1	Coin 2	Probability of Simple Event	Number of Heads Observed
	H	H		2
	H	T		1
	T	H		1
	T	T		0

Probability Distribution **Function** (pdf)

$$\underline{\quad}$$
$$\underline{\quad}$$
$$\underline{\quad}$$

Probability Distribution Table

0	
1	
2	

Cumulative Distribution

- formula, table or graph that gives all the possible values   and
              , the probability that   is at most

0	

1	
2	

Mean or Expected Value

- The average value of   in the population

Standard Deviation and Variance

(Standard Deviation)

- Measures the spread or variability of the random variable

(Variance)

Binomial Distribution

- Experiment consists of   identical trials
- Each trial results in one of two outcomes
- The probability of success on a single trial is equal to   and remains from trial to trial. Failure,
- Trials are independent
- Each trial is called a Bernoulli Trial

(Example)
3 distinguishable biased coins ⟶ 0.60 heads.

Coin 1	Coin 2	Coin 3	Number of Heads	Probability
H	H	H	3	
H	H	T	2	
H	T	H	2	

Coin 1	Coin 2	Coin 3	Number of Heads	Probability
H	T	T	1	
T	H	H	2	
T	H	T	1	
T	T	H	1	
T	T	T	0	

Probability Distribution Function

- If is the probability of success in Bernoulli Trials, then the probability of successes: