Chapter 2

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2.1

Def Experiment : any activity / situation w/ uncertainty about which $x \geq 2$ outcomes are possible

- coin toss, roll a die, draw a card

Def

Sample Space

- collection of all possible outcomes of a chance experiment

Notate - s or $\mathcal{U}$

- Toss a coin : heads or tails

Def

Event :

- any collection of outcomes from a sample space of a chance experiment

Notate

CAP letters : $A, B, C, \ldots$

Def Simple Event : event that consists of <u>one</u> outcome

Compound Event : event that consists of <u>more than one</u> outcome

Ex Tennis : A tennis shop carries 5 brands of rackets (Head, Prince, Sazenger, Wimbledon, Wilson). Each racket comes in midsize / oversize

a. sample space

insert diagram here

b. Let A be the event an oversized racket is piurchased

$$A = \{HO, PO, SO, WimO, WilO\}$$

c. Let B be the event the name brand starts w/ a W

$$B = \{WimM, WimO, WilM, WilO\}$$

Forming New Sets

Let A and B be any 2 events

Def Complement of A :

- all outcomes in S, not in A

Notate $A', \overline{A}, A^c$

Notate union - A or B - inclusive

$$A \cup B$$

intersection - A and B

$$A \cap B$$

Ex Tennis Cont.

d. $\overline{B}$ = brand does not start w/ W

$$\overline{B} = \{HO, HM, PO, PM, SO, SM\}$$

e. Head, Prince, and Wilson are US companies. Let C define rackets from the U.S.

$$C = \{HO, HM, PO, PM, WilO, WilM\}$$
$$B \cup C = \{HO, HM, PO, PM, WilO, WilM, WimO, WimM\}$$

f. List outcomes in $B \cap C$.

$$B \cap C = \{WilO, WilM\}$$

g. $\overline{(B \cap C)} = \{HO, HM, PO, PM, WimO, WimM\}$

Two Mutually Exclusive Events

Def mutually exclusive : no outcomes in common

Def Disjoint : no outcomes in common

include figure here

Note If A and B are disjoint, $A \cap B = \emptyset$

include figure here

Ex

$$A = \{4, 6, 8, 10, 12\} \quad B = \{8, 10, 12, 14\} \quad C = \{12, 14, 16\} \quad D = \{16, 18\}$$
$$A \cap B = \{8, 10, 12\}$$
$$B \cap C = \{12, 14\}$$
$$A \cap (C \cap D) = A \cap \{16\} = \emptyset$$
$$A \cap C = \{12\}$$
$$B \cap D = \{\} = \emptyset$$
$$(A \cap B) \cup C = \{8, 10, 12\} \cup C = \{8, 10, 12, 14, 16\}$$
$$(A \cap B) \cup (B \cap C) = \{8, 10, 12\} \cup \{12, 14\} = \{8, 10, 12, 14\}$$

2.2 Classical Probability

- N equal likely outcomes
- each outcome has probability $\frac{1}{N}$