Thurs_03_24

Thursday, March 24, 2022 2:36 PM

Reminders

1. Hw 10.3, 10.5 due Friday 03/25 11:59 pm
2. Exam #2 on Tuesday 03/29
3.

Problems from last time

Question

How many possible 5 cards are there in a poker hand from a 52 card deck $52C5 = 2598960$

Among the 2598960 possible 5-card poker hands from a 52-card deck how many contain the following cards

1. at least one card that is not a heart
2. Cards of more than one suit
3. at least one face card
4. at least one club, but not all clubs

Solution to problems from last time

(1) A = at least one card that is not a heart

A' = the five cards are heart

$n(A) = n(U) - n(A')$

$= 52C5 - 13C5$ (check with your calculator)

$= 2597673$

(2) A = Cards of more than one suit

$A' =$ Cards of the Same Suit

$n(A) = n(U) - n(A')$

$= 52C5 - 4\cdot(13C5)$ (Check with your calculator)

(3) $A =$ at least one face card (There are 12 face card in a deck)

$A' =$ none face cards

(How many none face card in a deck? $= 40$)

$n(A) = n(U) - n(A')$

$= 52C5 - 40C5$ (check with your calculator)

(4) $A =$ at least one club, but not all clubs

$A' =$ no clubs or all clubs

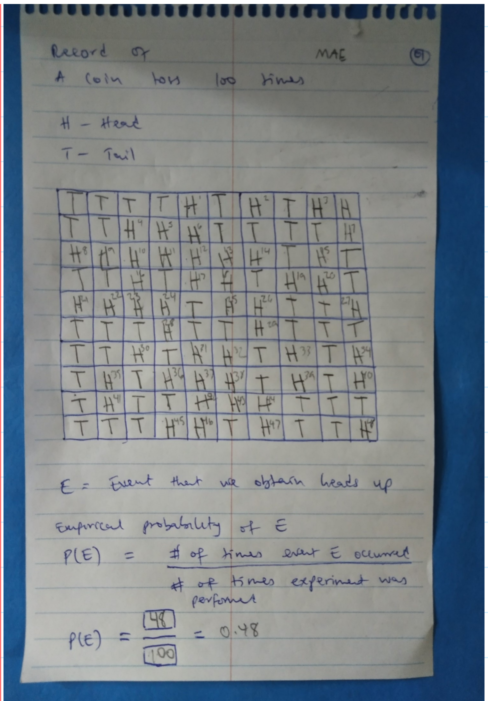
$n(A) = n(U) - n(A')$

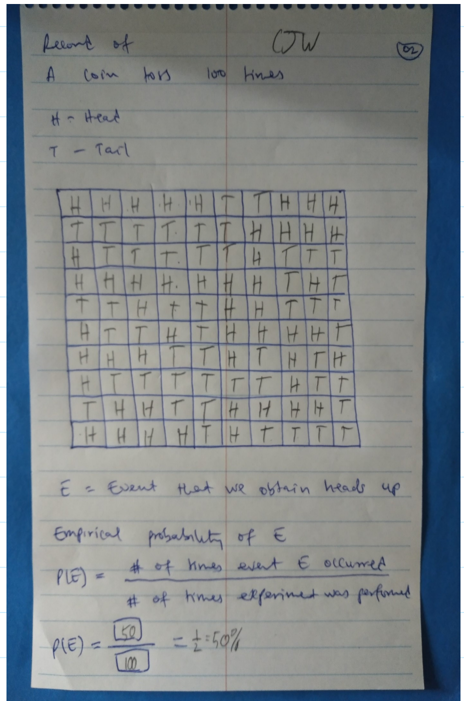
$= 52C5 - (39C5 + 13C5)$ (check with your calculator)

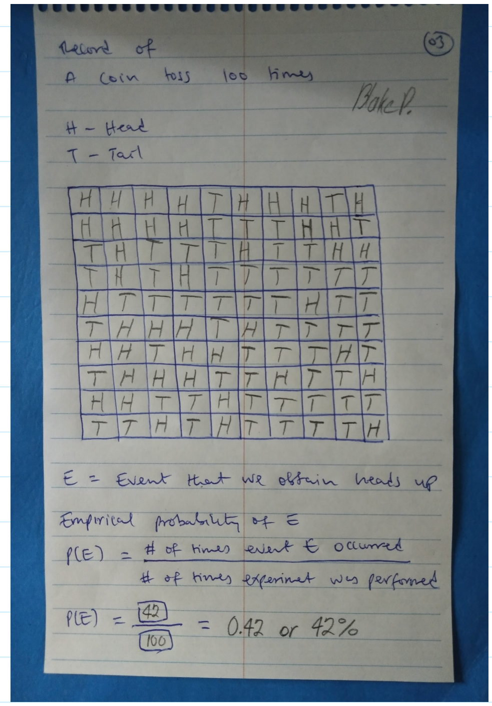
$=$

<u>Empirical probability Experiment</u>

(Paste student volunteer's report here)







Chapter 11 (probability)

11.1 Basic Concept

E = Event space

S = Sample space (all possible outcome)

Theoretical probability $= P(E) = \dfrac{n(E)}{n(S)} = \dfrac{\text{\# of event space}}{\text{\# of sample space}}$

Empirical probability $= P(E) = \dfrac{\text{\# of times E occurred}}{\text{\# of times experiment was done}}$

Law of Large Numbers

If we increase the # of times experiment was done, empirical probability will approach the theoretical probability

Exercise

1. Kathy wants to have exactly 2 daughters. Assume that boy and girl babies are equally likely. Find her probability of success for the following cases

(a) She has a total of 2 children

E = event of exactly 2 daughters

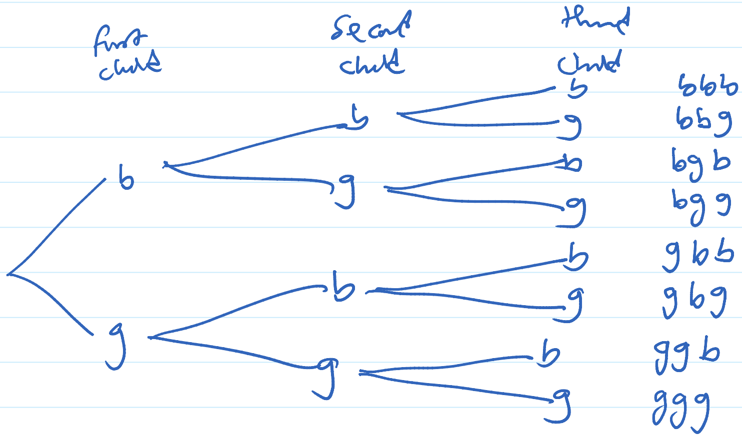
S = a total of 2 children $= \{bb, bg, gb, gg\}$

$$P(E) = \frac{n(E)}{n(S)} = \frac{1}{4} = 0.25$$

(b) She has a total of 3 children

E = event of exactly 2 daughters

S = a total of 3 children



$$P(E) = \frac{n(E)}{n(S)} = \frac{3}{8}$$

Monty-Hall problem

See Youtube

Probability in Genetics

Gregor Mendel

pure Red flower crossed with a pure white flower

RR rr

Second parent

first parent	r	r
R	Rr	Rr
R	Rr	Rr

first generation to second generation

Second parent

	R	r

Second generation to

		second parent	
		R	r
first parent	R	RR	Rr
	r	rR	rr

Second generation to third generation

Exercise

Determine the probability that a third generation offspring in the above tables

(a) is Red

E = a third gen offspring is red

$$P(E) = \frac{n(E)}{n(S)} = \frac{3}{4}$$

(b) is White

E = a third gen offspring is white

$$P(E) = \frac{n(E)}{n(S)} = \frac{1}{4}$$

Odds

Consider an Event E, If there are 'a' favorable outcomes for E and b unfavorable outcomes for E

Then we can say the following

1. The odds in favor of E are : a to b
2. The odds against E are : b to a

Example

Bob purchases 12 tickets for an office raffle. If 104 tickets are sold (each having an equal chance of winning). What are the odds against Bob

The # of favorable outcomes are : 12

the # of unfavorable outcomes are : $104 - 12 = 92$

Odds against Bob wining : 92 to 12

23 to 3

Chaging odds to probability

E is an event

$$p(E) = \frac{a}{a+b}$$

a = favorable outcomes for E

b = unfavorable outcomes for E