Statistics

Lecture 19

Feb 19-8:47 AM

Given $P(A) = .65$, $P(B) = .25$, $P(A \text{ and } B) = .15$

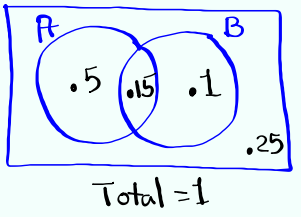
1) $P(\overline{A}) = 1 - P(A) = \boxed{.35}$

2) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .65 + .25 - .15 = \boxed{.75}$

3) Construct Venn Diagram

$.65 - .15 = .5$

$.25 - .15 = .1$



Use DeMorgan's Law to answer

4) $P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .75 = \boxed{.25}$

5) $P(\overline{A} \text{ or } \overline{B}) = P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .15 = \boxed{.85}$

Oct 1-8:48 AM

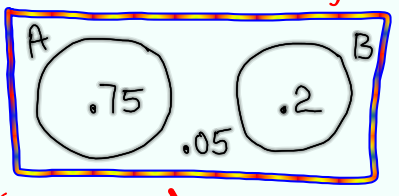
Given $P(A) = .75$, $P(B) = .2$

A & B are disjointed events

1) $P(\overline{B}) = 1 - P(B) = \boxed{.8}$

2) $P(A \text{ and } B) = \boxed{0}$

3) Construct Venn Diagram



4) $P(A \text{ or } B)$

$= P(A) + P(B) - P(A \text{ and } B)$

$= .75 + .2 - 0$

$= \boxed{.95}$

SG 11 ✓

Oct 1-9:00 AM

SG 12

Intro. to odds:

I flipped a coin 20 times.

It landed tails 14 times.

It landed heads 6 time.

14 : 6 → 7 : 3

Tails Tails

odds in favor of landing tails.

Oct 1-9:07 AM

A full deck of playing cards has 52 cards with 12 face cards.

Draw one card

$P(\text{face}) = \frac{12}{52} = \frac{3}{13}$

odds in favor of drawing a face card

face : # face

12 : 40

3 : 10

odds against drawing a face card

10 : 3

Oct 1-9:09 AM

Odds in favor of event E $\quad a : b$

odds against event E $\quad b : a$

$P(E) = \frac{a}{a+b}$, $P(\bar{E}) = \frac{b}{a+b}$

Suppose odds in favor of event E are $3:17$

1) odds against event E. $\boxed{17:3}$

2) $P(E) = \frac{3}{3+17} = \boxed{\frac{3}{20}}$

3) $P(\bar{E}) = \frac{17}{3+17} = \boxed{\frac{17}{20}}$

Oct 1-9:13 AM

Jose made 75 calls and landed 5 contracts.

1) P(he landed a contract) $= \frac{5}{75} = \boxed{\frac{1}{15}}$

2) odds in favor of landing contracts

$5 \text{ contracts} : 70 \text{ contracts}$ $\boxed{1:14}$

5 [÷] 70 [Math] [1: ▶Frac] [Enter]

3) odds against landing contracts

$\boxed{14:1}$

Oct 1-9:18 AM

How to find odds using probability:

odds in favor of event E are

$P(E) : P(\bar{E})$

Suppose $P(E) = .025$

1) $P(\bar{E}) = 1 - P(E) = \boxed{.975}$

2) odds in favor of event E.

$P(E) : P(\bar{E})$

$.025 : .975 \rightarrow \boxed{1:39}$

3) odds against event E.

$\rightarrow \boxed{39:1}$

Oct 1-9:23 AM

Prob. that LA Rams wins the Super Bowl this year is .04.

1) $P(W) = .04$

2) $P(\overline{W}) = 1 - .04 = .96$

3) odds in favor of LA Rams win the Super Bowl this year.

$P(W) : P(\overline{W})$

$.04 : .96 \rightarrow 1 : 24$

$1 : 24$ — \$1 bet, \$24 net profit

4) odds against them

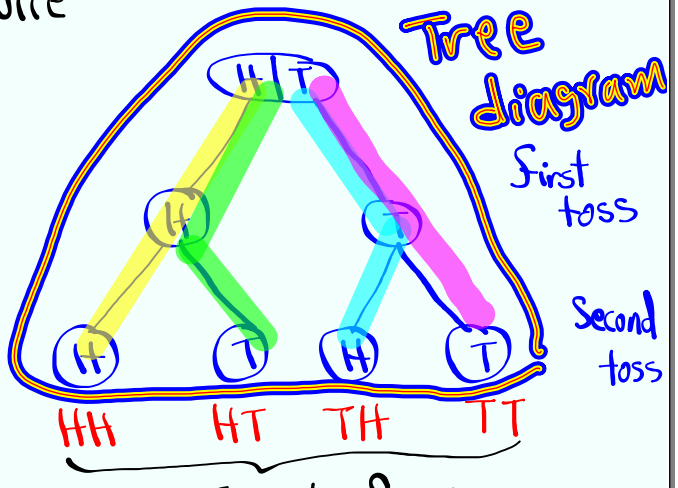
$24 : 1$

Oct 1-9:28 AM

Flip a Coin twice

H → Heads

T → Tails



Sample Space

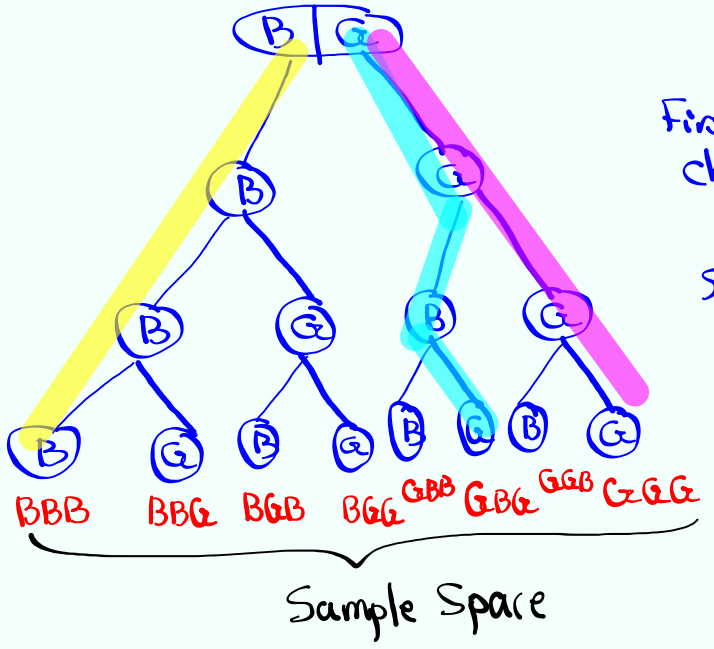
A complete list of all possible outcomes

Oct 1-9:34 AM

A family with 3 kids

B → Boy

G → Girl



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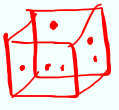
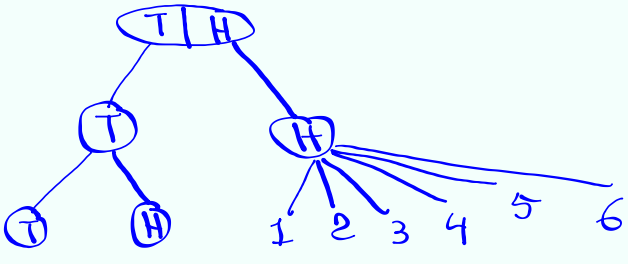
Flip a coin

If it is tails, flip it again

If it is heads, toss a die.



Make the Sample Space.



TT TH H1 H2 H3 H4 H5 H6

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Independent Events

when one outcome does not change the prob. of next outcome.

P(New born baby is a boy) = $\frac{1}{2}$

It is independent from any child before

A fair coin is tossed,

P(Land tails) = $\frac{1}{2}$

A multiple choice quiz, 5 questions, each question has 4 choices but one correct choice.

P(Guess Correctly on question 1) = $\frac{1}{4}$

P(Guess " " " 2) = $\frac{1}{4}$

" " " " " " " 3) = $\frac{1}{4}$

" " " " " " " 4) = $\frac{1}{4}$

" " " " " " " 5) = $\frac{1}{4}$

Oct 1-9:47 AM

Draw 2 Cards from a full deck of Playing Cards

P(First draw is Ace) = $\frac{4}{52} = \frac{1}{13}$

with replacement

P(Second draw is Ace) = $\frac{4}{52} = \frac{1}{13}$

▷ Makes them independent

without replacement

P(Second Card is Ace) = $\frac{3}{51} = \frac{1}{17}$

▷ Dependent

Oct 1-9:54 AM