Statistics
Lecture 12

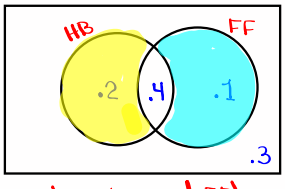
Feb 19-8:47 AM

$P(HB) = .6$

$P(FF) = .5$

$P(HB \text{ and } FF) = .4$

3) Venn Diagram



1) $P(\overline{HB}) = 1 - P(HB) = \boxed{.4}$

2) $P(HB \text{ OR } FF) = P(HB) + P(FF) - P(HB \text{ and } FF)$

$= .6 + .5 - .4 = \boxed{.7}$

4) $P(\text{HB only OR FF only}) = .2 + .1 = \boxed{.3}$

Use Venn Diagram

5) $P(\overline{HB} \text{ and } \overline{FF}) = P(\overline{HB \text{ or } FF}) = 1 - .7 = \boxed{.3}$

Use DeMorgan's Law

6) $P(\overline{HB} \text{ or } \overline{FF}) = P(\overline{HB \text{ and } FF}) = 1 - .4 = \boxed{.6}$

Nov 9-7:21 AM

$P(A) = .65$, $P(B) = .25$, A & B are disjointed events.

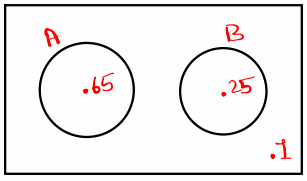
1) $P(\bar{A}) = 1 - .65 = .35$

2) $P(\bar{B}) = 1 - .25 = .75$

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

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .65 + .25 - 0 = .9$

5) Venn Diagram



Total = 1

6) $P(\bar{A} \text{ and } \bar{B})$

DeMorgan's law

$= P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .9 = .1$

Nov 9-7:33 AM

A deck of playing cards with 40 cards has 15 red, 10 face, and 2 aces.

15 Red 25 Red

Find the odds in favor of selecting a

1) Red Card

Red : # $\overline{\text{Red}}$

15 : 25 → 3:5

2) Face Card

Face : # $\overline{\text{Face}}$

10 : 30 → 1:3

3) Find the odds against selecting an Ace.

$\overline{\text{Aces}}$: # Ace

38 : 2 → 19 : 1

Nov 9-7:41 AM

$P(E) = .25$

1) $P(\bar{E}) = 1 - P(E) = 1 - .25 = \boxed{.75}$

2) odds in favor of event E

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

$.25 : .75$ → $\boxed{1 : 3}$

3) odds against event E.

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

$.75 : .25$ → $\boxed{3 : 1}$

Nov 9-7:48 AM

odds in favor of event E are $3 : 37$.

1) odds against E → $\boxed{37 : 3}$

2) $P(E) = \frac{3}{3+37} = \boxed{\frac{3}{40}}$

3) $P(\bar{E}) = \frac{37}{3+37} = \boxed{\frac{37}{40}}$

Money line

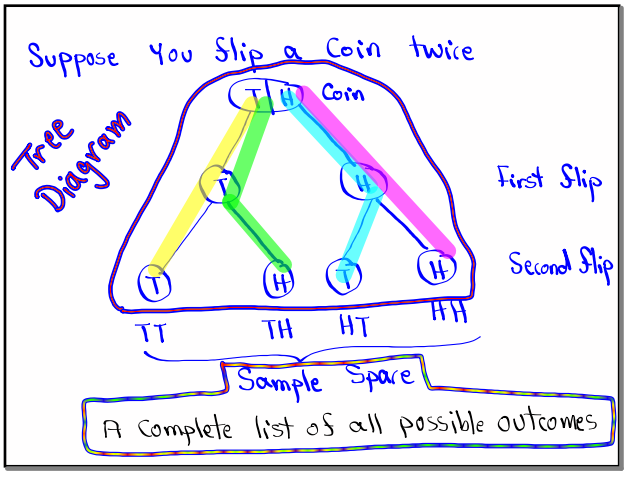
odds for Lakers to win the championship this year is +800.

You bet $100 to win $800 net profit.

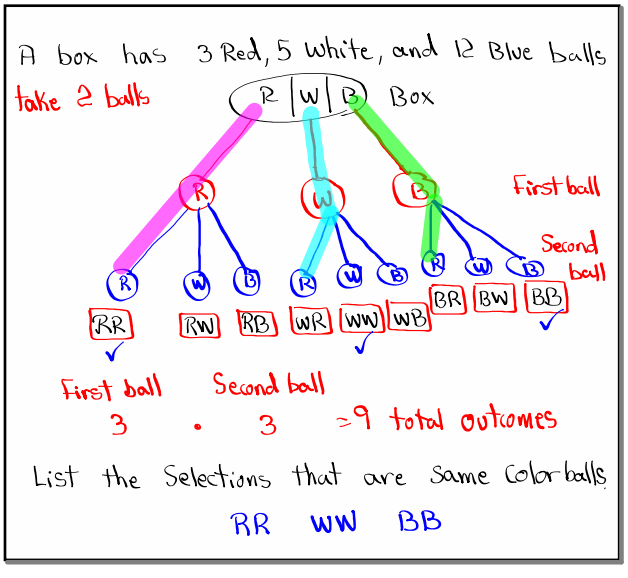
odds for Nuggets to win the championship this year is −275.

You bet $275 to win $100 Net Profit

Nov 9-7:52 AM



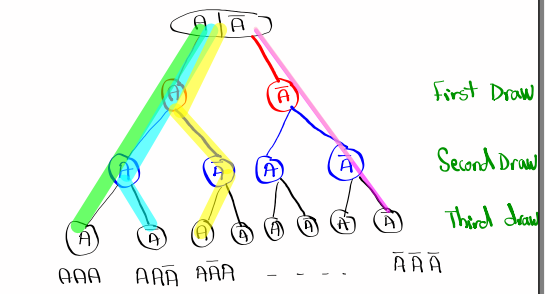
Nov 9-8:02 AM



Nov 9-8:06 AM

A standard deck of playing cards has 52 cards and 4 Aces.

Let's draw 3 cards, and focus on Ace & $\overline{\text{Ace}}$



Sample Space — All Aces

AAA
AAĀ
AĀA
AĀĀ
ĀAA
AĀĀ
ĀĀA
ĀĀĀ

Sample Space

No Aces

Suppose we want 2 Aces & 1 $\overline{\text{Ace}}$

AAĀ, AĀA, ĀAA

what about 1 Ace & 2 $\overline{\text{Aces}}$

AĀĀ, ĀAĀ, ĀĀA

Nov 9-8:14 AM

SG 12

Multiplication Rule:

Keyword : AND

Multiple – Action Event

Flip a Coin 2 times

TT
TH
HT
HH

Draw 3 Cards

FFF
FF$\overline{\text{F}}$
⋮
$\overline{\text{F}}\overline{\text{F}}\overline{\text{F}}$

Answering a 5-question multiple-choice exam

CCCCC

Some C & Some $\overline{\text{C}}$

$\overline{\text{C}}\overline{\text{C}}\overline{\text{C}}\overline{\text{C}}\overline{\text{C}}$

Nov 9-8:48 AM

Independent Events:

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

$P(\text{boy}) = .5$, $P(\text{girl}) = .5$

for any newborn baby, $P(B) = .5$, $P(G) = .5$

It does not matter what we had before.

You are guessing on a multiple-choice exam.

4 questions, each question has 5 choices but only one correct choice.

on any question $P(\text{guess correctly}) = \frac{1}{5}$

It is independent of previous question.

A standard deck of playing cards has 52 Cards, 12 face Cards.

If we select cards with replacement

$P(\text{get face card on any selection})$

this does not change on any draw. why not?

$= \frac{12 \text{ face cards}}{52 \text{ Total Cards}} = \frac{12}{52} = \boxed{\frac{3}{13}}$

Nov 9-8:52 AM

If A and B are independent events, then

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

Ex: $P(A) = .7$, $P(B) = .4$, A and B are independent events

1) $P(\overline{A}) = \boxed{.3}$

2) $P(\overline{B}) = \boxed{.6}$

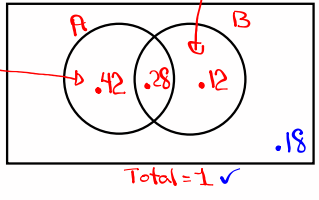
3) $P(A \text{ and } B) = P(A) \cdot P(B) = (.7)(.4) = \boxed{.28}$

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

$= .7 + .4 - .28$

$= \boxed{.82}$

5) Venn Diagram



Nov 9-9:03 AM

$P(A) = .6$, $P(B) = .5$, A & B are independent events

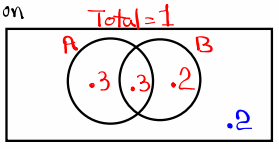
1) $P(\overline{A}) = \boxed{.4}$ 2) $P(\overline{B}) = \boxed{.5}$

3) $P(A \text{ and } B) = P(A) \cdot P(B) = \boxed{.3}$

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = \boxed{.8}$

↑ Addition

5) Venn Diagram

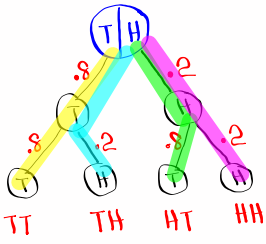


Nov 9-9:11 AM

Multiplication Rule with Tree diagram

A loaded coin is tossed twice.

$P(\text{Tails}) = .8$, $P(\text{Heads}) = .2$



First toss

Second toss

$P(TT) = (.8)(.8) = .64$

$P(TH) = (.8)(.2) = .16$

$P(HT) = (.2)(.8) = .16$

$P(HH) = (.2)(.2) = .04$

Total = 1

# Tails	P(# tails)
2	.64
1	.32
0	.04

Tails → L1

P(# Tails) → L2

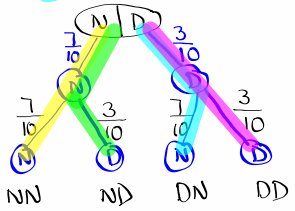
use 1-Var Stats with L1 & L2

$\bar{x} = 1.6$ S_x blank $n = 1$

Nov 9-9:17 AM

A box has 3 Dimes & 7 Nickels.

Take 2 Coins with replacement



$P(NN) = P(10¢) = \frac{7}{10} \cdot \frac{7}{10} = \frac{49}{100} = .49$

$P(ND) = P(15¢) = \frac{7}{10} \cdot \frac{3}{10} = \frac{21}{100} = .21$

$P(DN) = P(15¢) = \frac{3}{10} \cdot \frac{7}{10} = \frac{21}{100} = .21$

$P(DD) = P(20¢) = \frac{3}{10} \cdot \frac{3}{10} = \frac{9}{100} = .09$

Total = 1

Total	P(Total)
10¢	.49
15¢	.42
20¢	.09

Total → L1

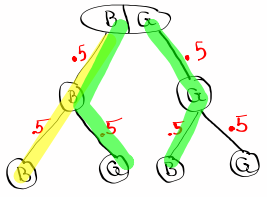
P(Total) → L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 13$ S = Blank $n = 1$

Nov 9-9:32 AM

Family with 2 Kids



$P(2 \text{ Boys}) = (.5)(.5) = .25$

$P(\text{Exactly 1 Boy}) = P(BG \text{ or } GB) = 2(.5)(.5) = .5$

$P(\text{no Boys}) = P(GG) = (.5)(.5) = .25$

# Boys	P(# boys)
2	.25
1	.5
0	.25

L1 L2

Boys → L1

P(# Boys) → L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 1$ S = Blank $n = 1$ ← Total Prob.

SG 12

Read my emails

School is closed Friday.

There is Tutoring on Saturday

Tutoring Lab is in G5-009

Nov 9-9:43 AM