Statistics

Lecture 8

Feb 19-8:47 AM

A box has 2 Red, 3 white, and 15 blue balls.

1) Find odds in favor of selecting a red ball

\# Red : # ~~Red~~

2 : 18 → $\boxed{1:9}$

2) Find odds against selecting a white ball.

\# ~~white~~ : # white

$\boxed{17 : 3}$

Jul 9-4:31 PM

Given $P(E) = .5\%$ $P(\bar{E}) = 1 - P(E) = .995$

1) write $P(E)$ in reduced fraction.

$.5\% = \frac{.5}{100} = \boxed{\frac{1}{200}}$

.5 ÷ 100 [Math] [1:▶Frac] [Enter]

2) write $P(E)$ in decimal notation.

$= \boxed{.005}$ [Math] [2:▶Dec] [Enter]

3) find odds in favor of event E.

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

$.005 : .995 \rightarrow \boxed{1 : 199}$

.005 ÷ .995 [Math] [1:▶Frac] [Enter]

4) find odds against event E.

$\boxed{199 : 1}$

Jul 9-4:35 PM

odds in favor of event E are

3 : 37

1) odds against event E.

$\boxed{37 : 3}$

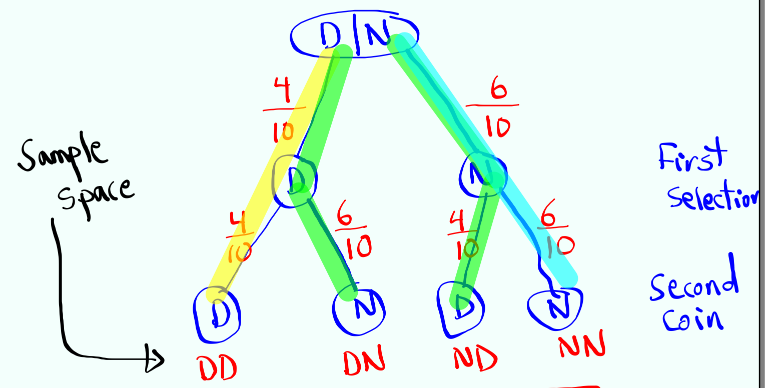
2) $P(E) = \frac{3}{3+37} = \boxed{\frac{3}{40}}$

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

Jul 9-4:42 PM

A piggy bank has 4 dimes & 6 Nickels

Randomly take 2 Coins $\boxed{\text{with replacement}}$



$P(DD) = P(20¢) = \frac{4}{10} \cdot \frac{4}{10} = \frac{16}{100} = \boxed{.16}$

$P(DN \text{ or } ND) = P(15¢) = 2 \cdot \frac{4}{10} \cdot \frac{6}{10} = \frac{48}{100} = \boxed{.48}$

$P(NN) = P(10¢) = \frac{6}{10} \cdot \frac{6}{10} = \frac{36}{100} = \boxed{.36}$

Jul 9-4:45 PM

Total(¢)	P(Total)
20¢	.16
15¢	.48
10¢	.36

Clear All lists

Total (¢) → L1

P(Total) → L2

[STAT] [→] CALC

1: 1-Var Stats

L1 & L2

$\bar{x} = 14$

S_x = Blank

$n = 1$ ← Total Prob. = 1

Jul 9-4:53 PM

$P(A) = .3$ $P(B) = .6$

A & B are independent Events.

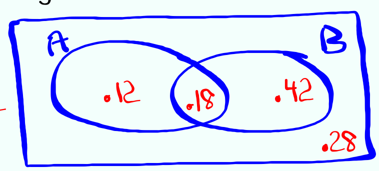
1) $P(\bar{A}) = 1 - P(A) = \boxed{.7}$

2) $P(\bar{B}) = 1 - P(B) = \boxed{.4}$

3) $P(A \text{ and } B) = P(A) \cdot P(B) = (.3)(.6)$ $\boxed{.18}$

4) Venn Diagram

$.3 - .18 = .12$
$.6 - .18 = .42$



Total = 1

$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = \boxed{.28}$

DeMorgan's Law

$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = \boxed{.82}$

Jul 9-4:59 PM

Dependent Events

one outcome changes the prob. of next outcome

Take 2 Cards, No replacement from a full-deck of playing Cards.

$P(2 \text{ Aces}) = \frac{4}{52} \cdot \frac{3}{51} = \frac{1}{221}$

4 $\boxed{\div}$ 52 $\boxed{\times}$ 3 $\boxed{\div}$ 51 $\boxed{\text{Math}}$ $\boxed{1{:}\blacktriangleright\text{Frac}}$ $\boxed{\text{Enter}}$

let's take 3 Cards,

$P(\text{all Face Cards}) = \frac{12}{52} \cdot \frac{11}{51} \cdot \frac{10}{50} = \boxed{\frac{11}{1105}}$

Jul 9-5:07 PM

Dependent Events

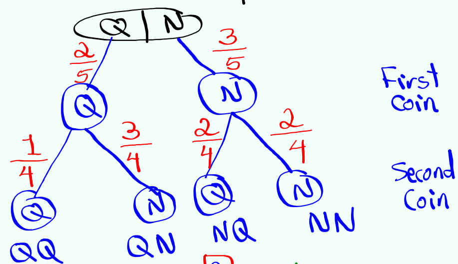
$P(A \text{ and } B) = P(A) \cdot P(B|A)$

A happens then B happens

Given

Piggy bank has 2 Quarters & 3 nickels

Take 2 Coins, No replacement



$P(QQ) = P(50¢) = \frac{2}{5} \cdot \frac{1}{4} = \frac{\boxed{2}}{20} = .1$

$P(QN \text{ or } NQ) = P(30¢) = 2 \cdot \frac{2}{5} \cdot \frac{3}{4} = \frac{\boxed{12}}{20} = .6$

$P(NN) = P(10¢) = \frac{3}{5} \cdot \frac{2}{4} = \frac{\boxed{6}}{20} = .3$

Jul 9-5:14 PM

Total(¢)	P(Total)
50 ¢	.1
30 ¢	.6
10 ¢	.3

clear All lists

Total → L1

P(Total) → L2

$\boxed{\text{STAT}}$ $\boxed{\triangleright}$ CALC

$\boxed{\text{1: 1-Var Stats}}$

L1 & L2

$\bar{x} = 26$

$S_x =$ Blank

$n = 1$ ← Total prob. = 1

Jul 9-5:23 PM

3 Females   7 Makes   Take 2 people

No replacement

Sample Space

FF   FM   MF   MM

$P(FF) = \frac{\cancel{3}^{1}}{\cancel{10}_{5}} \cdot \frac{\cancel{2}^{1}}{\cancel{9}_{3}} = \frac{1}{15}$

$P(FM \text{ or } MF) = \cancel{2} \cdot \frac{\cancel{3}}{\cancel{10}_{5}} \cdot \frac{7}{\cancel{9}_{3}} = \frac{7}{15}$

$P(MM) = \frac{7}{\cancel{10}_{5}} \cdot \frac{\cancel{6}^{\cancel{2}}}{\cancel{9}_{3}} = \frac{7}{15}$

$P(\text{at least } 1 \text{ Female}) = 1 - P(\text{No Females})$

$= 1 - P(MM) = 1 - \frac{7}{15} = \boxed{\frac{8}{15}}$

$P(\text{at least } 1 \text{ Male}) = 1 - P(\text{No males})$

$= 1 - P(FF) = 1 - \frac{1}{15} = \boxed{\frac{14}{15}}$

Jul 9-5:27 PM

What are the possible # of Females?

2, 1, or 0.

# Females	P(# Females)
2	1/15
1	7/15
0	7/15

L1 (# Females)   L2 (P(# Females))

Clear all lists

#F → L1

P(#F) → L2

$\boxed{\text{STAT}}\boxed{\rightarrow}$ CALC

$\boxed{\text{1:1-Var Stats}}$

L1 & L2

$\bar{x} = .6$

$S_x =$ Blank

$n = 1 \leftarrow$ Total Prob.

Jul 9-5:36 PM

Conditional Probability

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

If we isolate $P(B|A)$

$$\boxed{P(B|A) = \frac{P(A \text{ and } B)}{P(A)}}$$

Ex: $P(A) = .4$ $\quad P(B) = .5$ $\quad P(A \text{ and } B) = .3$

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.3}{.4} = \boxed{.75}$$

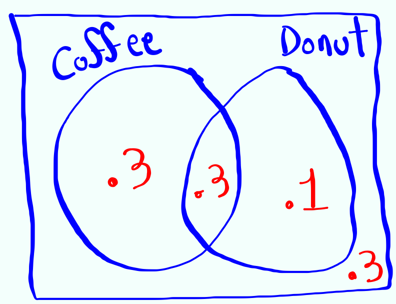
$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.3}{.5} = \boxed{.6}$$

Jul 9-5:55 PM

$P(\text{Coffee}) = .6$

$P(\text{Donut}) = .4$

$P(\text{Coffee and Donut}) = .3$



Total = 1

$$P(\text{Donut}|\text{Coffee}) = \frac{P(C \text{ and } D)}{P(\text{Coffee})} = \frac{.3}{.6} = \boxed{.5}$$

$$P(\text{Coffee}|\text{Donut}) = \frac{P(C \text{ and } D)}{P(D)} = \frac{.3}{.4} = \boxed{.75}$$

Jul 9-6:01 PM

Tom goes shopping

$P(\text{Shirt}) = .6$

$P(\text{Tie}) = .5$

$\boxed{P(\text{Shirt} \mid \text{Tie}) = .8}$

$P(\text{Shirt and Tie})$

$$P(S \mid T) = \frac{P(S \text{ and } T)}{P(T)}$$

$$.8 = \frac{P(S \text{ and } T)}{.5}$$

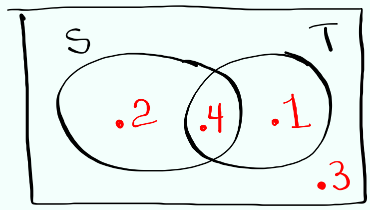
Cross-Multiply

$\boxed{P(S \text{ and } T) = .4}$

$P(\text{Tie} \mid \text{Shirt})$

$$= \frac{P(S \text{ and } T)}{P(S)}$$

$$= \frac{.4}{.6} = \frac{2}{3} = \boxed{.667}$$



Total = 1

Jul 9-6:06 PM

Tommy's Burger hired 8 people for Two shifts, 5 Morning, 3 evening.

New hires are 3 Females and 5 males.

P(Morning shift has all males)

$$= \frac{\cancel{5}}{8} \cdot \frac{\cancel{4}}{7} \cdot \frac{\cancel{3}}{\cancel{6}} \cdot \frac{\cancel{2}}{\cancel{5}} \cdot \frac{1}{\cancel{4}} = \boxed{\frac{1}{56}}$$

P(Evening shift has all Females) =

$$\frac{3}{8} \cdot \frac{2}{7} \cdot \frac{1}{6} = \boxed{\frac{1}{56}}$$

P(at least 1 Female in the morning shift)

MMMMF
MMMFM
MMFMM
MFMMM
FMMMM

$= 1 - P(\text{No Female})$

$= 1 - P(\text{All Males})$

$= 1 - \frac{1}{56} = \boxed{\frac{55}{56}}$

P(at least 1 Male in the evening shift)

$= 1 - P(\text{No Male})$

$= 1 - P(\text{All Females}) = 1 - \frac{3}{8} \cdot \frac{2}{7} \cdot \frac{1}{6} = \boxed{\frac{55}{56}}$

SG 13

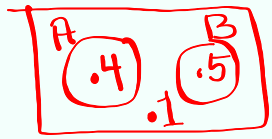
Jul 9-6:14 PM

$P(A) = .4$ $\quad$ $P(B) = .5$

1) Find $P(A \text{ and } B)$ if A & B are M.E.E.

Disjoint

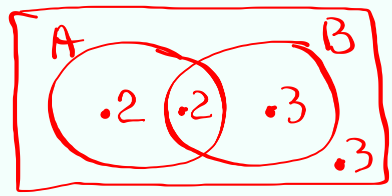
$= \boxed{0}$



2) Find $P(A \text{ and } B)$ if A & B are independent events.

$= P(A) \cdot P(B)$

$= (.4)(.5) = \boxed{.2}$



Jul 9-6:27 PM

I flipped a loaded coin 3 times.

$P(T) = .6$ $\quad$ $P(H) = .4$

T T T

Some T & Some H

H H H

$P(\text{All Tails}) = (.6)(.6)(.6) = \boxed{.216}$

$P(2T \,\&\, 1H) = 3(.6)(.6)(.4) = \boxed{.432}$

$P(1T \,\&\, 2H) = 3(.4)(.4)(.6) = \boxed{.288}$

$P(\text{All Heads}) = (.4)(.4)(.4) = \boxed{.064}$

TTH $\quad$ THT $\quad$ HTT

THH $\quad$ HTH $\quad$ HHT

Jul 9-6:31 PM

what are possible values for # of tails?

3 2 1 0

# Tails	P(# tails)
3	.216
2	.432
1	.288
0	.064

L1 L2

Clear All lists

Tails → L1

P(# tails) → L2

use 1-Var Stats with L1 & L2

$\bar{x} = 1.8$

$S_x =$ Blank

$n = 1$ ← Total prob.

Jul 9-6:39 PM

Class QZ 4 $\boxed{\text{Open Notes}}$

Given P(A) = .7 , P(B) = .4 , A & B are independent events

1) P(A and B) = P(A) · P(B)

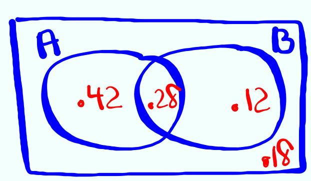
= (.7)(.4) = $\boxed{.28}$

2) P(A or B)

= P(A) + P(B) − P(A and B)

= .7 + .4 − .28 = $\boxed{.82}$

3) Construct Venn diagram.



Total = 1

Jul 9-6:45 PM