Statistics

Lecture 13

Feb 19-8:47 AM

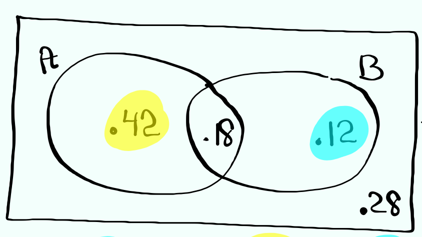
Class Quiz 6

Given $P(A) = .6$, $P(B) = .3$, A and B are independent events

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

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

$= .6 + .3 - .18 = \boxed{.72}$



Total = 1

$P(A \text{ only OR } B \text{ only}) = .42 + .12 = \boxed{.54}$

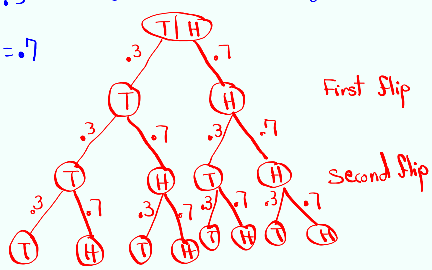
Oct 9-12:11 PM

A coin is flipped 3 times.

$P(\text{Tails}) = .3$

$P(\text{Heads}) = .7$

Draw Tree Diagram



$P(TTT) = (.3)(.3)(.3) = .027$

$P(2T \,\&\, 1H) = 3(.3)(.3)(.7) = .189$

TTH, THT, HTT

$P(1T \,\&\, 2H) = 3(.3)(.7)(.7) = .441$

THH, HTH, HHT

$P(HHH) = (.7)(.7)(.7) = .343$

$P(\text{at least } 1 \text{ tail}) = 1 - P(\text{No tails})$
$= 1 - P(\text{All Heads})$
$= 1 - .343 = \boxed{.657}$

$P(\text{at least } 1 \text{ head}) = 1 - P(\text{No heads})$
$= 1 - P(\text{All tails})$
$= 1 - .027 = \boxed{.973}$

Oct 9-12:25 PM

# tails	P(# tails)
3	.027
2	.189
1	.441
0	.343

tails → L1

P(# tails) → L2

Use $\boxed{\text{1-Var Stats}}$ with L1 & L2, find

$\bar{x} = .9$

$S_x =$ blank

$n = 1$ ← Total Prob.

Oct 9-12:36 PM

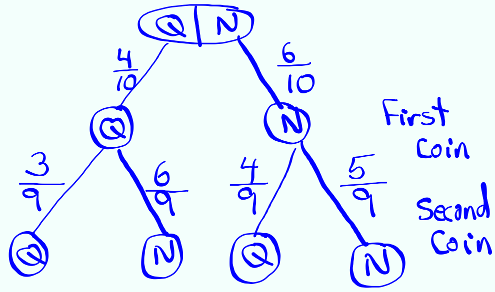
4 Quarters, 6 Nickels   Take 2 Coins

No replacement

Q → Quarter

N → Nickel

2) Draw Tree Diagram



1) Sample Space

N N

N Q

Q N

Q Q

$P(10¢) = P(NN) = \frac{6}{10} \cdot \frac{5}{9} = \frac{30}{90}$

$P(30¢) = P(NQ \text{ or } QN) = 2 \cdot \frac{6}{10} \cdot \frac{4}{9} = \frac{48}{90}$

$P(50¢) = P(QQ) = \frac{4}{10} \cdot \frac{3}{9} = \frac{12}{90}$

Oct 9-12:41 PM

Total ¢	P(Total ¢)
10¢	30/90
30¢	48/90
50¢	12/90

Total ¢ → L1

P(Total ¢) → L2

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

with L1 & L2 to find

$\bar{x} = 26$

$S_x =$ Blank

$n = 1$

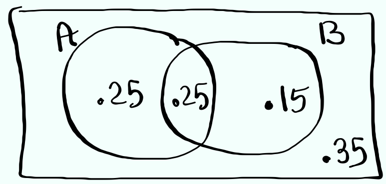
Oct 9-12:49 PM

$P(A) = .5$

$P(B) = .4$

$P(A \text{ and } B) = .25$

1) Draw Venn Diagram



2) $P(A \text{ or } B)$
$= .5 + .4 - .25 = \boxed{.65}$

Conditional Prob.

$$P(\underbrace{B \mid A}_{\text{and}}) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.25}{.5} = \boxed{.5}$$

$$P(\underbrace{A \mid B}_{\text{and}}) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.25}{.4} = \boxed{.625}$$

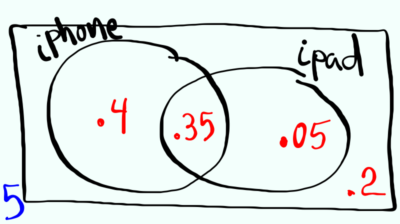
Oct 9-12:53 PM

$P(\text{iPhone}) = .75$

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

$P(\text{iPhone and iPad}) = .35$

① Venn Diagram



2) $P(\text{iPhone or iPad}) = .75 + .4 - .35 = .8$

$$P(\underbrace{\text{ipad} \mid \text{iphone}}_{\text{And}}) = \frac{P(\text{ipad and iPhone})}{P(\text{iPhone})} = \frac{.35}{.75} = \boxed{.467}$$

$$P(\text{iPhone} \mid \text{iPad}) = \frac{.35}{.4} = \boxed{.875}$$

Oct 9-1:02 PM

use your calc

1) ${}_6C_0 = 1$

3) ${}_{12}C_5 = 792$

2) ${}_6C_6 = 1$

4) ${}_{12}C_7 = 792$

5 Females, 10 Males

Select 4 people order does not matter

$$P(\text{All Females}) = \frac{{}_5C_4 \cdot {}_{10}C_0}{{}_{15}C_4} = \frac{5}{1365} = \boxed{\frac{1}{273}}$$

$$P(\text{All Males}) = \frac{{}_5C_0 \cdot {}_{10}C_4}{{}_{15}C_4} = \frac{210}{1365} = \boxed{\frac{2}{13}}$$

$$P(\text{at least } 1 \text{ Female}) = 1 - P(\text{No Females})$$
$$= 1 - P(\text{All males})$$
$$= 1 - \frac{2}{13} = \boxed{\frac{11}{13}}$$

$$P(\text{at least } 1 \text{ Male}) = 1 - P(\text{No Male})$$
$$= 1 - P(\text{All Female}) = 1 - \frac{1}{273} = \boxed{\frac{272}{273}}$$

Oct 9-1:13 PM

Suppose

$P(A) = .6$

$P(B) = .5$

$P(A \mid B) = .8$

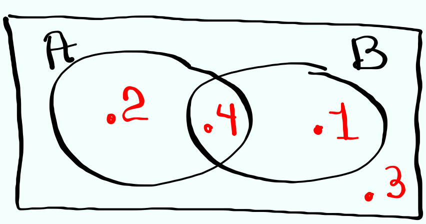
Find $P(A \text{ and } B)$

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

$$.8 = \frac{P(A \text{ and } B)}{.5}$$

Cross-Multiply

$$P(A \text{ and } B) = (.8)(.5) = \boxed{.4}$$



$$P(B \mid A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.4}{.6} = \frac{2}{3} \approx \boxed{.667}$$

Oct 9-1:56 PM

$P(\text{Shirt}) = .65$

$P(\text{Tie}) = .3$

$P(\text{Shirt} \mid \text{Tie}) = .75$

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

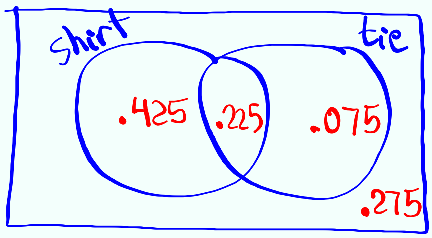
$P(\text{shirt} \mid \text{tie}) = \dfrac{P(\text{shirt \& tie})}{P(\text{tie})}$

$.75 = \dfrac{P(\text{Shirt and tie})}{.3}$

Cross-Multiply

$P(\text{shirt and tie}) = (.75)(.3)$

$= \boxed{.225}$



Total = 1

$P(\text{tie} \mid \text{shirt}) = \dfrac{.225}{.65} \approx \boxed{.346}$

Oct 9-2:01 PM

A store manager hired 12 people. 5 Females,
7 Males

8 work in the morning,
4 " " " afternoon

1) P(2F and 2M work in the afternoon)

$= \dfrac{{}_5C_2 \cdot {}_7C_2}{{}_{12}C_4} = \dfrac{210}{495} = \dfrac{14}{33}$

2) P(at least 1 Male work in the afternoo)

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

$= 1 - P(\text{All Females}) = 1 - \dfrac{{}_5C_4 \cdot {}_7C_0}{{}_{12}C_4}$

$= 1 - \dfrac{5}{495} = \boxed{\dfrac{98}{99}}$

3) P(at least 1 Female in the morning)

$\boxed{1}$ 7 Males
1 Female need to
Cover morning shift

Oct 9-2:08 PM

P(4 Females & 4 Males Cover the (morning) shift)

$$= \frac{{}_5C_4 \cdot {}_7C_4}{{}_{12}C_8} = \frac{175}{495} = \frac{35}{99}$$

Oct 9-2:19 PM

A full deck of playing Cards

Draw 5 Cards, No replacement, order does not matter.

$$P(\text{2 face cards and 2 Aces}) = \frac{{}_{12}C_2 \cdot {}_4C_2 \cdot {}_{36}C_1}{{}_{52}C_5}$$

$$= \frac{14\,256}{2\,598\,960} \approx \boxed{.005}$$

Oct 9-2:22 PM

Class Quiz 7

6 Females, 9 Males Select 4 people

order does not matter.

P(2F and 2M) in reduced fraction.

$$P(2F \,\&\, 2M) = \frac{{}_6C_2 \cdot {}_9C_2}{{}_{15}C_4} = \frac{540}{1365} = \boxed{\frac{36}{91}}$$

$\approx .396$

Oct 9-2:30 PM