Statistics

Lecture 22

Feb 19-8:47 AM

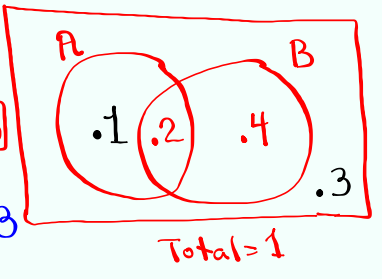
Class Quiz 6

Given $P(A) = .3$ $P(B) = .6$ $P(A \text{ and } B) = .2$

1) $P(\bar{A}) = 1 - P(A)$
$= .7$ ✓

2) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .3 + .6 - .2$
$= .7$ ✓

3) Construct Venn Diagram.



$P(A \text{ only or } B \text{ only}) = .1 + .4 = .5$

$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = .3$

$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = .8$

Oct 3-9:48 AM

$P(A) = .4$

$P(B) = .7$

A & B are independent events

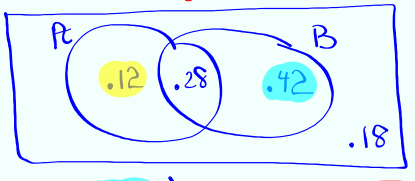
1) $P(\overline{A}) = 1 - .4 = .6$

2) $P(\overline{B}) = 1 - .7 = .3$

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

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .4 + .7 - .28 = .82$

5) Construct Venn Diagram



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

$P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = .18$

$P(\overline{A} \text{ or } \overline{B}) = P(\overline{A \text{ and } B}) = .72$

Oct 7-8:54 AM

A box has 3 dimes, 5 nickels.

We take 2 Coins with replacement.

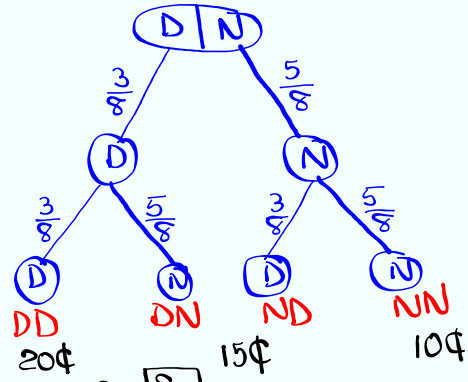
Sample Space

DD

DN

ND

NN



$P(20¢) = P(DD) = \frac{3}{8} \cdot \frac{3}{8} = \frac{9}{64}$

$P(15¢) = P(DN \text{ or } ND) = 2 \cdot \frac{3}{8} \cdot \frac{5}{8} = \frac{30}{64}$

$P(10¢) = P(NN) = \frac{5}{8} \cdot \frac{5}{8} = \frac{25}{64}$

Total	P(Total)
20	9/64
15	30/64
10	25/64

Oct 7-9:03 AM

Total	P(Total)
20	9/64
15	30/64
10	25/64

Clear all lists

Total → L1

P(Total) → L2

use 1-var stats with L1 & L2 to find

$\bar{x} = 13.75$

Sx = blank

$n = 1$ ← Total prob.

Oct 7-9:11 AM

A box has 20 balls.

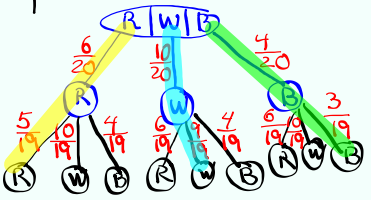
6 Red, 10 white, 4 blue.

Take 2 balls, No replacement

RR RW RB

WR WW WB

BR BW BB



$P(RR) = \frac{6}{20} \cdot \frac{5}{19} = \frac{30}{380}$ $P(WW) = \frac{10}{20} \cdot \frac{9}{19} = \frac{90}{380}$ $P(BB) = \frac{4}{20} \cdot \frac{3}{19} = \frac{12}{380}$

P(both balls are Same Color) =

RR OR WW OR BB

$= \frac{30}{380} + \frac{90}{380} + \frac{12}{380} = \frac{132}{380} = \frac{33}{95}$

P(Both balls are different Colors) =

$= 1 - P(\text{Same Color}) = 1 - \frac{33}{95} = \frac{62}{95}$

Oct 7-9:14 AM

5 Females

10 Males

Select 3 different people

No replacement

$P(FFF) = \frac{5}{15} \cdot \frac{4}{14} \cdot \frac{3}{13} = \boxed{\frac{2}{91}}$

$P(MMM) = \frac{10}{15} \cdot \frac{9}{14} \cdot \frac{8}{13} = \boxed{\frac{24}{91}}$

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

$= 1 - P(\text{All Males}) = 1 - \frac{24}{91} = \boxed{\frac{67}{91}}$

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

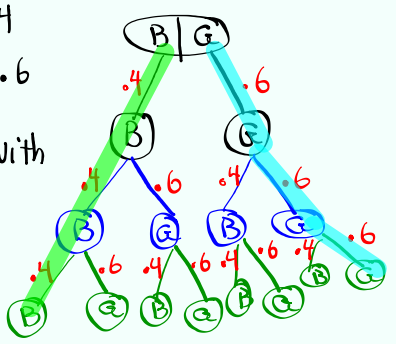
$= 1 - P(\text{All Females}) = 1 - \frac{2}{91} = \boxed{\frac{89}{91}}$

Oct 7-9:26 AM

Suppose $P(\text{Boy}) = .4$

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

Consider family with 3 kids



$P(3 \text{ Boys}) = (.4)(.4)(.4) = \boxed{.064}$

$P(3 \text{ Girls}) = (.6)(.6)(.6) = \boxed{.216}$

$P(\text{at least 1 boy}) = 1 - P(\text{All girls}) = 1 - .216 = \boxed{.784}$

$P(2 \text{ Boys \& } 1 \text{ Girl}) = 3(.4)(.4)(.6) = \boxed{.288}$

BBG, BGB, GBB

$P(1 \text{ B \& } 2 \text{ Girls}) = 3(.4)(.6)(.6) = \boxed{.432}$

BGG, GBG, GGB

Oct 7-9:34 AM

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

L1 L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 1.2$

S_x = Blank

$n = 1$ ← Total Prob.

Oct 7-9:44 AM

Dependent Events

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

~~52~~ 51 Cards

~~12~~ 11 Face Cards

4 Aces

Draw 2 Cards

No Replacement

P(Face card, then Ace Card)

$= \frac{12}{52} \cdot \frac{4}{51} = \boxed{\frac{4}{221}}$

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

P(Two face Cards) $= \frac{12}{52} \cdot \frac{11}{51} = \boxed{\frac{11}{221}}$

P(at least 1 ace) $= 1 - P(\text{No Aces})$

$= 1 - \frac{48}{52} \cdot \frac{47}{51} = \boxed{\frac{33}{221}}$

P(at least 1 face Card)

Sb 12

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

$= 1 - \frac{40}{52} \cdot \frac{39}{51} = \boxed{\frac{7}{17}}$

Oct 7-9:49 AM