Statistics

Lecture 7

Feb 19-8:47 AM

Conditional Probability:

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

Given

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

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

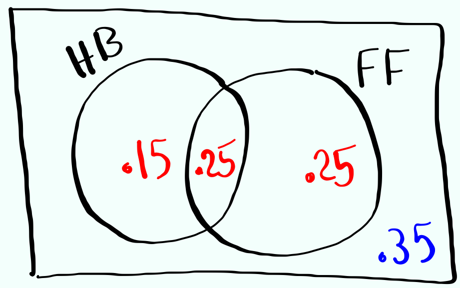
$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.3}{.5} = \boxed{.6}$$

Jan 20-4:33 PM

$P(HB) = .4$

$P(FF) = .5$

$P(HB \text{ and } FF) = .25$



Total = 1

$$P(FF \mid HB) = \frac{P(HB \text{ and } FF)}{P(HB)} = \frac{.25}{.4} = \boxed{.625}$$

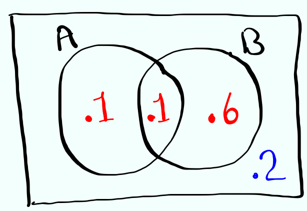
$$P(HB \mid FF) = \frac{P(HB \text{ and } FF)}{P(FF)} = \frac{.25}{.5} = \boxed{.5}$$

Jan 20-4:37 PM

$P(A) = .2$, $P(B) = .7$ $P(A \text{ and } B) = .1$

1) $P(\overline{A}) = 1 - .2 = \boxed{.8}$

3) Venn Diagram



Total = 1

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

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

$= .2 + .7 - .1 = \boxed{.8}$

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

$= 1 - .8 = \boxed{.2}$

De Morgan's Law

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

$= 1 - .1 = \boxed{.9}$

Jan 20-4:42 PM

$P(A) = .3$, $P(B) = .5$, $\underbrace{\text{A and B are M.E.E.}}_{}$

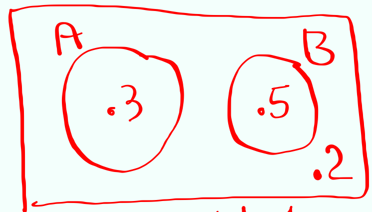
Disjointed events

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

1) $P(\bar{A}) = 1 - .3 = \boxed{.7}$

2) $P(\bar{B}) = 1 - .5 = \boxed{.5}$

3) Draw Venn Diagram



Total = 1

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

$= .3 + .5 - 0 = \boxed{.8}$

Jan 20-4:48 PM

$P(A) = .3$, $P(B) = .5$, A and B are independent events

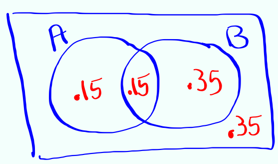
1) $P(A \text{ and } B) = P(A) \cdot P(B)$

$= (.3)(.5) = \boxed{.15}$

$.3 - .15 = .15$

$.5 - .15 = .35$

2) Venn Diagram



Total = 1

Addition Rule

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

$= .3 + .5 - .15 = \boxed{.65}$

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

DeMorgan's Law

$= 1 - .15 = \boxed{.85}$

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

$= 1 - .65 = \boxed{.35}$

Jan 20-4:53 PM

2 Females, 3 Males

Select 2 different People

FF $\quad P(2 \text{ Females}) = \frac{2}{5} \cdot \frac{1}{4} = \frac{2}{20} = \boxed{.1}$

FM $\quad P(1F \,\&\, 1M) = 2 \cdot \frac{2}{5} \cdot \frac{3}{4} = \frac{12}{20} = \boxed{.6}$

MF

MM $\quad P(2 \text{ Males}) = P(\text{No Females}) = \frac{3}{5} \cdot \frac{2}{4} = \frac{6}{20} = \boxed{.3}$

#F (L1)	P(#F) (L2)
2	.1
1	.6
0	.3

STAT → CALC

1-Var Stats

$\bar{x} = .8$

S = Blank

Total Prob. → $n = 1$

Jan 20-5:00 PM

A piggy bank has 2 dimes & 3 nickels

Take 2 Coins with replacement.

Sample Space:

NN → 10¢ → $P(10¢) = P(NN) = \frac{3}{5} \cdot \frac{3}{5} = \frac{9}{25} = \boxed{.36}$

ND

DN → 15¢ → $P(15¢) = P(ND \text{ or } DN) = 2 \cdot \frac{3}{5} \cdot \frac{2}{5} = \frac{12}{25} = \boxed{.48}$

DD → 20¢ → $P(20¢) = P(DD) = \frac{2}{5} \cdot \frac{2}{5} = \frac{4}{25} = \boxed{.16}$

T ¢ (L1)	P(T ¢) (L2)
10¢	.36
15¢	.48
20¢	.16

Use 1-Var stats with L1 & L2.

$\bar{x} = 14$

S = Blank

$n = 1$

Jan 20-5:09 PM

Odds in favor of event E are

3 : 47.

1) odds against E $\boxed{47:3}$

2) $P(E) = \frac{3}{3+47} = \boxed{\frac{3}{50}}$

3) $P(\bar{E}) = \frac{47}{3+47} = \boxed{\frac{47}{50}}$

Jan 20-5:18 PM

$P(E) = .875$

1) $P(\bar{E}) = 1 - P(E) = \boxed{.125}$

2) odds in favor of event E.

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

$.875 : .125$ $\rightarrow$ $\boxed{7:1}$

3) odds against event E. $\boxed{1:7}$

Jan 20-5:21 PM

A deck of Cards has 40 Cards with 3 aces.

Draw 3 Cards, No replacement.

$P(AAA) = \frac{3}{40} \cdot \frac{2}{39} \cdot \frac{1}{38} = \boxed{\frac{1}{9880}}$

$P(\bar{A}\bar{A}\bar{A}) = \frac{37}{40} \cdot \frac{36}{39} \cdot \frac{35}{38} = \boxed{\frac{777}{988}}$

Total Prob. 1

P(at least one Ace) = 1 − P(No aces)

$= 1 - \frac{777}{988} = \boxed{\frac{211}{988}}$

$\overline{AAA}$ Not all of them are aces

$\bar{A}\bar{A}\bar{A}$ No Ace at all

$\overline{A \text{ and } B}$

$\bar{A}$ and $\bar{B}$

Jan 20-5:24 PM