Statistics

Lecture 21

Feb 19-8:47 AM

If A and B are independent events,

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

A happens then B happens.

Suppose $P(A) = .3$, $P(B) = .8$, A & B are independent events

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

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

$P(A \text{ and } B) = P(A) \cdot P(B) = (.3)(.8) = \boxed{.24}$

Indep. events

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

$= .3 + .8 - .24 = \boxed{.86}$

Construct Venn Diagram

$.3 - .24 = .06$

$.8 - .24 = .56$

$P(A \text{ only}) = .06$ $P(B \text{ only}) = .56$

$P(A \text{ only} \text{ or } B \text{ only}) = .06 + .56 = \boxed{.62}$

De Morgan's Law

$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - .86 = \boxed{.14}$

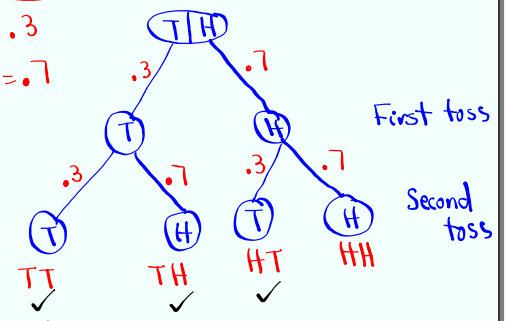
$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = 1 - .24 = \boxed{.76}$

Oct 3-8:49 AM

A loaded coin is tossed twice.

$P(T) = .3$

$P(H) = .7$



$P(TT) = (.3)(.3) = .09$

$P(TH) = (.3)(.7) = .21$

$P(HT) = (.7)(.3) = .21$

$P(HH) = (.7)(.7) = .49$

Sum of all prob. is 1.

#T	P(#T)
2	.09
1	.42
0	.49

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

$= 1 - P(HH)$

$= 1 - .49 = .51$

Oct 3-9:04 AM

#T	P(#T)
2	.09
1	.42
0	.49

L1 L2

Clear All lists

#T → L1

P(#T) → L2

STAT → CALC

1:1-Var Stats

L1 & L2

$\bar{x} = .6$

$S_x =$ blank

$n = 1$ ← Total prob. = 1

Oct 3-9:13 AM

A piggy bank has 2 quarters & 8 Dimes.

Take 2 Coins with replacement

Q → Quarter, D → Dime

Sample Space

QQ → 50¢

✓QD

✓DQ → 35¢

✓DD → 20¢

$P(50¢) = P(QQ) = \frac{2}{10} \cdot \frac{2}{10} = .04$

$P(35¢) = P(QD \text{ or } DQ) = \frac{2}{10} \cdot \frac{8}{10} + \frac{8}{10} \cdot \frac{2}{10} = .32$

$P(20¢) = P(DD) = \frac{8}{10} \cdot \frac{8}{10} = .64$

P(at least 1 dime) = 1 − P(No dimes)

= 1 − P(QQ)

= 1 − .04 = .96

¢	P(¢)
50	.04
35	.32
20	.64

Oct 3-9:16 AM

¢	P(¢)
50	.04
35	.32
20	.64

L1 L2

Clear All lists

¢ → L1

P(¢) → L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 26$

S_x = Blank

$n = 1$

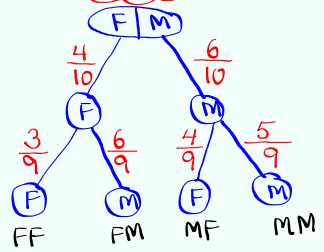
Oct 3-9:25 AM

There are 4 Females and 6 Males.

We need to Select 2 people.

Sample Space

- ✓ F F
- ✓ F M
- ✓ M F
- M M



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

$P(FM) = \frac{4}{10} \cdot \frac{6}{9} = \frac{24}{90}$

$P(MF) = \frac{6}{10} \cdot \frac{4}{9} = \frac{24}{90}$

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

#F	P(#F)
2	$\frac{12}{90}$
1	$\frac{48}{90}$
0	$\frac{30}{90}$

P(Select at least 1 Female) = 1 − P(No F.)

= 1 − P(MM)

$= 1 - \frac{30}{90} = \frac{2}{3}$

Oct 3-9:27 AM

#F	P(#F)
2	$\frac{12}{90}$
1	$\frac{48}{90}$
0	$\frac{30}{90}$

L1 L2

Clear all lists

#F → L1

P(#F) → L2

STAT → CALC

1: 1-Var Stats

with L1 & L2

$\bar{x} = .8$

S_x = blank

$n = 1$ ← Total Prob.

Oct 3-9:39 AM

Dependent Events

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

(Given)

52 Cards, 4 Aces

take two Cards, No replacement

$P(\text{Two Aces}) = P(\text{First card}) \cdot P(\text{Second Card})$

$= P(\text{Ace}) \cdot P(\text{Ace} \mid \text{first was Ace})$

$= \frac{4}{52} \cdot \frac{3}{51} = \boxed{\frac{1}{221}}$

$P(\text{NO Aces}) = \frac{48}{52} \cdot \frac{47}{51} = \boxed{\frac{188}{221}}$

Oct 3-9:42 AM

Class Quiz 6

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

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

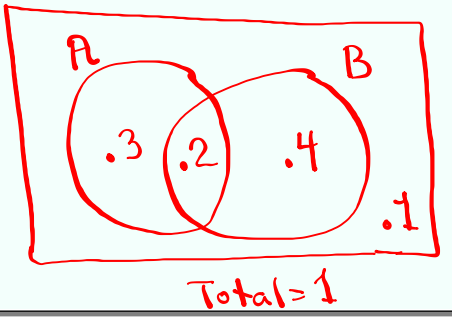
$= \boxed{.7}$

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

$= .3 + .6 - .2$

$= \boxed{.7}$

3) Construct Venn Diagram.



Oct 3-9:48 AM