Statistics

Lecture 23

Feb 19-8:47 AM

Product Rule for dependent events

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

Given

A box has 4 Red & 6 Blue balls.

Take two balls, $\boxed{\text{No replacement}}$

✓R R	$P(RR) = \frac{4}{10} \cdot \frac{3}{9} = \frac{12}{90}$
✓R B✓ Sample Space	$P(1R \,\&\, 1B) = 2 \cdot \frac{4}{10} \cdot \frac{6}{9} = \frac{48}{90}$
✓B R✓	
B B✓	$P(BB) = \frac{6}{10} \cdot \frac{5}{9} = \frac{30}{90}$

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

$= 1 - \mathbf{P(BB)} = 1 - \frac{30}{90} = \boxed{\frac{2}{3}}$

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

$= 1 - \mathbf{P(RR)} = 1 - \frac{12}{90} = \boxed{\frac{13}{15}}$

Oct 8-8:55 AM

#Red	P(#Red)
2	12/90
1	48/90
0	30/90

L1 (#Red column), L2 (P(#Red) column)

Clear all lists

#Red → L1

P(#Red) → L2

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

with L1 & L2

$\bar{x} = .8$

S_x = Blank

$n = 1$ ← Total Prob.

Oct 8-9:05 AM

4 Women, 6 Men

we need 3 people (No replacement

W W W	M W W
W W M	M W M
W M W	M M W
W M M	M M M

} Sample Space

$P(WWW) = \frac{4}{10} \cdot \frac{3}{9} \cdot \frac{2}{8} = \frac{1}{30}$

$P(2W \,\&\, 1M) = 3 \cdot \frac{4}{10} \cdot \frac{3}{9} \cdot \frac{6}{8} = \frac{3}{10}$

$P(1W \,\&\, 2M) = 3 \cdot \frac{4}{10} \cdot \frac{6}{9} \cdot \frac{5}{8} = \frac{1}{2}$

$P(MMM) = \frac{6}{10} \cdot \frac{5}{9} \cdot \frac{4}{8} = \frac{1}{6}$

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

$= 1 - P(MMM) = 1 - \frac{1}{6} = \frac{5}{6}$

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

$= 1 - P(WWW) = 1 - \frac{1}{30} = \boxed{\frac{29}{30}}$

Oct 8-9:10 AM

# W	P(# W)
3	1/30
2	3/10
1	1/2
0	1/6

L1 ; L2

Clear All lists

W → L1

P(# W) → L2

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

with L1 & L2

$\bar{x} = 1.2$

$S_x =$ blank

$n = 1$

Oct 8-9:20 AM

Product Rule

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

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

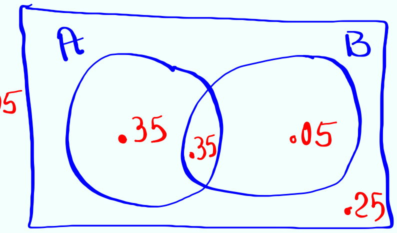
Conditional Prob.

Oct 8-9:24 AM

$P(A) = .7$ $.7 - .35 = .35$

$P(B) = .4$ $.4 - .35 = .05$

$P(A \text{ and } B) = .35$



Total = 1

$P(A \text{ or } B) = .7 + .4 - .35 = \boxed{.75}$

$P(\overbrace{A \mid B}^{\text{And}}) = \dfrac{P(A \text{ and } B)}{P(B)} = \dfrac{.35}{.4} = \boxed{.875}$

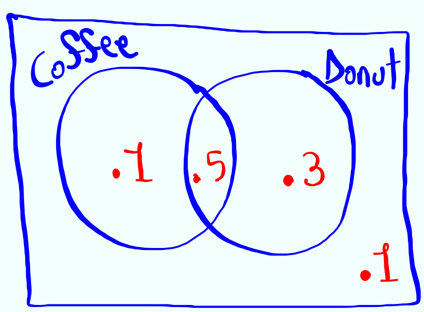
$P(\overbrace{B \mid A}^{\text{AND}}) = \dfrac{P(A \text{ and } B)}{P(A)} = \dfrac{.35}{.7} = \boxed{.5}$

Oct 8-9:27 AM

$P(\text{Coffee}) = .6$ $.6 - .5 = .1$

$P(\text{Donut}) = .8$ $.8 - .5 = .3$

$P(\text{Coffee and Donut}) = .5$



Total = 1

$P(\overbrace{\text{Coffee} \mid \text{Donut}}^{\text{And}}) = \dfrac{P(\text{Coffee and Donut})}{P(\text{Donut})} = \dfrac{.5}{.8} = \boxed{.625}$

$P(\overbrace{\text{Donut} \mid \text{Coffee}}^{\text{AND}}) = \dfrac{P(\text{Coffee and Donut})}{P(\text{Coffee})} = \dfrac{.5}{.6} \approx \boxed{.833}$

Oct 8-9:33 AM

There are 5 people

Adam Bill Carol Daisy Eddie

Select 2 people

~~AB~~	~~AC~~	~~AD~~	~~AE~~
BA	~~BC~~	~~BD~~	~~BE~~
CA	CB	~~CD~~	~~CE~~
DA	DB	DC	~~DE~~
EA	EB	EC	ED

First · Second

5 · 4

20 choices

If order does not matter

10 choices

Combination Formula

$_nC_r$

order does not matter

No replacement

$_5C_2$

5 $\boxed{\text{MATH}}$ PRB $\boxed{_nC_r}$ 2 $\boxed{\text{Enter}}$

$\boxed{10}$

Oct 8-9:40 AM

A basketball team has 12 players, Coach needs 5 players to start the game.

How many ways can the coach select starting 5 players? $_{12}C_5 = \boxed{792}$

CA Lotto, 50 numbers, choose 5

$_{50}C_5 = 2,118,760$

Oct 8-9:48 AM

4 W, 6 M Select 4 people

1) How many ways can you do this?

$$_{10}C_4 = 210$$

2) How many ways can you select 2 Women & 2 Men

$$_4C_2 \cdot {}_6C_2 = 90$$

3) $P(2W \,\&\, 2M) = \frac{_4C_2 \cdot {}_6C_2}{_{10}C_4} = \frac{90}{210} = \boxed{\frac{3}{7}}$

Oct 8-9:52 AM

52 Cards, 12 Face Cards, 4 Aces

Draw 5 Cards, No replacement

order does not matter

$$P(4 \text{ face } \& \text{ } 1 \text{ Ace}) = \frac{_{12}C_4 \cdot {}_4C_1}{_{52}C_5}$$

$$= \frac{1980}{2598960} = \frac{33}{43316}$$

$$\approx \boxed{7.6 \times 10^{-4}}$$

Oct 8-9:57 AM