Statistics

Spring 2023

Lecture 20

Feb 19-8:47 AM

Class Qz 4:

$P(A) = .65$, $P(B) = .3$ A & B are M.E.E.
$P(A \text{ and } B) = 0$

1) $P(\overline{A}) = 1 - P(A) = .35$ ✓

2) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ Addition Rule
$= .65 + .3 - 0 = .95$ ✓

3) Construct Venn Diagram,

A   B
.65   .3
.05

Total = 1

Odds in favor of event B.
$P(B) : P(\overline{B})$
$.3 : .7 \Rightarrow 3 : 7$

Odds against event A
$P(\overline{A}) : P(A)$
$.35 : .65 \Rightarrow 7 : 13$

$.35 \div .65$ [MATH] [1:▶ Frac] [enter] $\frac{7}{13}$

Mar 9-8:16 AM

Multiplication Rule:

A box has 3 dimes and 5 nickels.

Randomly Select 2 Coins with [replacement]

D → Dimes, N → Nickels

Sample Space: NN   ND   DN   DD

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

$P(ND) = P(N) \cdot P(D) = \dfrac{5}{8} \cdot \dfrac{3}{8} = \dfrac{15}{64}$ ⟵ P(15¢)

$P(DN) = P(D) \cdot P(N) = \dfrac{3}{8} \cdot \dfrac{5}{8} = \dfrac{15}{64}$ ↙ $= \boxed{\dfrac{30}{64}}$

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

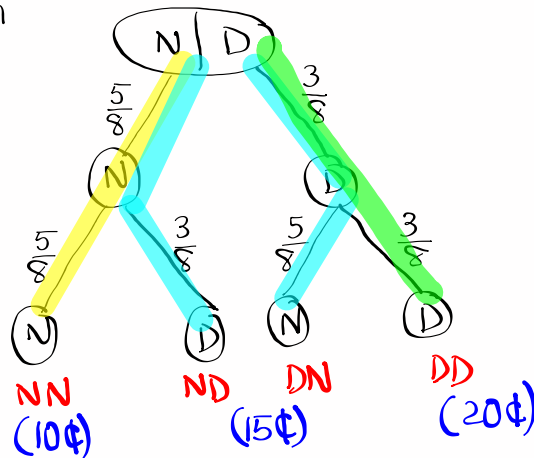| Total	P(Total)
10¢	25/64
15¢	30/64
20¢	9/64

Total → L1 , P(Total) → L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 13.75$ S = Blank   n = 1

Tree Diagram

$P(\text{Total } 10¢) = \dfrac{5}{8} \cdot \dfrac{5}{8} = \dfrac{25}{64}$

$P(\text{Total } 15¢) = 2 \cdot \dfrac{5}{8} \cdot \dfrac{3}{8} = \dfrac{30}{64}$

$P(\text{Total } 20¢) = \dfrac{3}{8} \cdot \dfrac{3}{8} = \dfrac{9}{64}$

Redo last problem (without replacement.)

$^4\cancel{5}$ Nickels, 3 Dimes

Sample Space   NN   N D   DN   DD

10¢   15¢   20¢

$P(10¢) = P(NN) = \dfrac{5}{8} \cdot \dfrac{4}{7} = \dfrac{20}{56}$

$P(15¢) = P(1N \text{ & } 1D) = 2 \cdot \dfrac{5}{8} \cdot \dfrac{3}{7} = \dfrac{30}{56}$

$P(20¢) = P(DD) = \dfrac{3}{8} \cdot \dfrac{2}{7} = \dfrac{6}{56}$

Total	P(Total)
10¢	20/56
15¢	30/56
20¢	6/56

Total → L1, P(Total) → L2

Use 1-Var Stats with L1 & L2

$\bar{x} = 13.75$ S = Blank $n = 1$

Mar 13-7:45 AM

Tree Diagram

without replacement

$\boxed{N | D}$

$\dfrac{5}{8}$ $\dfrac{3}{8}$

N   D

$\dfrac{4}{7}$ $\dfrac{3}{7}$ $\dfrac{5}{7}$ $\dfrac{2}{7}$

N   D   N   D
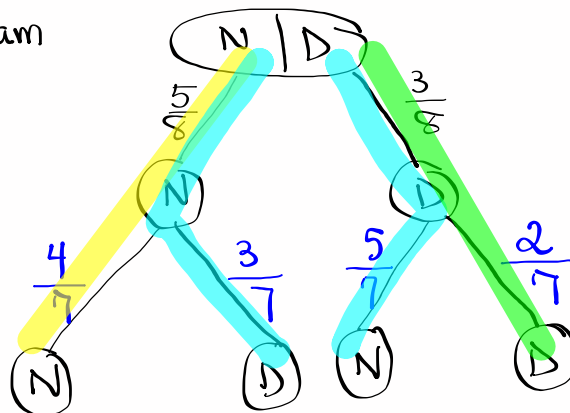
$P(NN) = \dfrac{5}{8} \cdot \dfrac{4}{7} = \dfrac{20}{56}$

$P(1N \text{ & } 1D) = 2 \cdot \dfrac{5}{8} \cdot \dfrac{3}{7} = \dfrac{30}{56}$

$P(DD) = \dfrac{3}{8} \cdot \dfrac{2}{7} = \dfrac{6}{56}$

Mar 13-7:53 AM

4 Females and 6 Males

No replacement

Select 3 (different people)

F → Female , M → Male

FFF

FFM

FMF

FMM

MFF

MFM

MMF

MMM

} Sample Space

$P(\text{3 Females}) = \frac{4}{10} \cdot \frac{3}{9} \cdot \frac{2}{8}$

$= \boxed{\frac{1}{30}}$

$P(\text{3 Males}) = \frac{6}{10} \cdot \frac{5}{9} \cdot \frac{4}{8}$

$= \frac{5}{30} = \boxed{\frac{1}{6}}$

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

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

Let's add all prob. $\frac{1}{30} + \frac{1}{6} + \frac{3}{10} + \frac{1}{2} = \boxed{1}$

Mar 13-7:58 AM

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

Females → L1

P(# Females) → L2

Use 1-Var Stats with
L1 & L2

$\overline{x} = 1.2$

S = Blank

n = 1 ← Total Prob.

Mar 13-8:12 AM

4

A deck of playing cards has 45 cards, with 3 aces. (Not standard deck of playing cards)

If we randomly draw one card,

1) $P(Ace) = \dfrac{3}{45}$

$= \boxed{\dfrac{1}{15}}$

2) $P(\overline{Ace}) = \dfrac{42}{45}$

$= \boxed{\dfrac{14}{15}}$

3) odds in favor of selecting ace.

#Aces : # $\overline{Aces}$

3 : 42 ⟶ $\boxed{1 : 14}$

4) odds against selecting Ace.

$14 : 1$

Mar 13-8:17 AM

$P(A) = .025$

1) $P(\overline{A}) = 1 - P(A) = 1 - .025 = \boxed{.975}$

2) odds in favor of event A

$P(A) : P(\overline{A})$ ⟶ $\boxed{1 : 39}$

$.025 : .975$

3) odds against event A

$\boxed{39 : 1}$

Exam 1 ⟶ Thursday

SG 1 ⟶ SG 11

Your work must be similar to class notes

You can arrive as early as 6:00 AM

You must be in the view of the camera.

You can use class notes, SG, and everything in my website.

Mar 13-8:23 AM