Statistics
Spring 2023
Lecture 22

Feb 19-8:47 AM

Class QZ 5

Given $P(A) = .25$

1) $P(\bar{A}) = 1 - P(A) = 1 - .25 = .75$ ✓

2) odds in favor of event A.

$P(A) : P(\bar{A})$ $\quad .25 : .75$ → 1:3 ✓

3) odds against event A. → 3:1 ✓

Mar 14-8:13 AM

Independent events:

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

Ex: $P(A) = .75$, $P(B) = .8$, A & B are independent events.

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

2) odds in favor of event B. $P(B) : P(\bar{B})$ $.8 : .2$ → 4 : 1

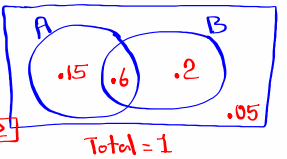
3) odds against event B. → 1 : 4

4) $P(A \text{ and } B) = P(A) \cdot P(B) = (.75)(.8) = .6$

5) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .75 + .8 - .6 = .95$

Addition Rule

6) Construct Venn Diagram



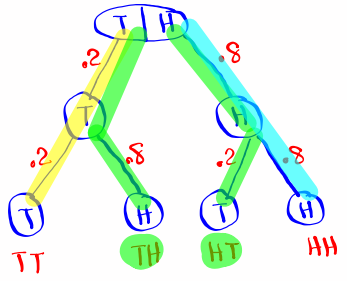
$P(A \text{ only}) = P(A) - P(A \text{ and } B) = .75 - .6 = .15$

$P(B \text{ only}) = P(B) - P(A \text{ and } B) = .2$

Mar 15-7:20 AM

A loaded coin is tossed twice.

$P(\text{Tails}) = .2$, $P(\text{Heads}) = .8$



$P(\text{2 tails}) = P(TT) = (.2)(.2) = .04$

$P(\text{1 tail}) = P(TH \text{ or } HT) = 2 \cdot (.2)(.8) = .32$

$P(\text{0 tails}) = P(HH) = (.8)(.8) = .64$

# tails	P(# tails)
2	.04
1	.32
0	.64

L1 L2

tails → L1

P(# tails) → L2

List

use 1-Var Stats with L1 & L2

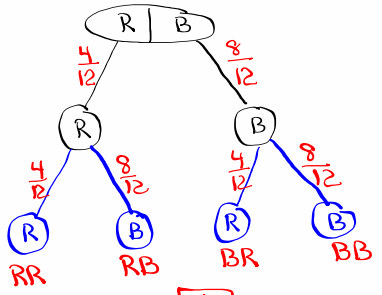
Freq. List

to find

$\bar{x} = .4$ S = Blank $n = 1$

Mar 15-7:30 AM

A box has 4 Red & 8 Blue Balls.
Randomly Select 2 Balls with replacement



$P(2 \text{ Red balls}) = \frac{4}{12} \cdot \frac{4}{12} = \boxed{\frac{1}{9}}$

$P(1 \text{ Red Ball}) = P(RB \text{ or } BR) = 2 \cdot \frac{4}{12} \cdot \frac{8}{12} = \boxed{\frac{4}{9}}$

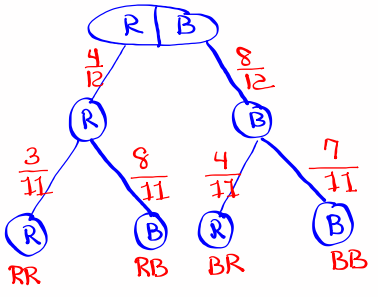
$P(\text{No Red Ball}) = P(BB) = \frac{8}{12} \cdot \frac{8}{12} = \boxed{\frac{4}{9}}$

# Red	P(#Red)
2	1/9
1	4/9
0	4/9

#Red → L1, P(#Red) → L2
Use 1-Var Stats with L1 & L2
to find
$\bar{x} = .\overline{6}$ S = blank $n = 1$

Mar 15-7:41 AM

Redo last example without replacement



$P(2 \text{ Red}) = \frac{4}{12} \cdot \frac{3}{11} = \boxed{\frac{1}{11}}$

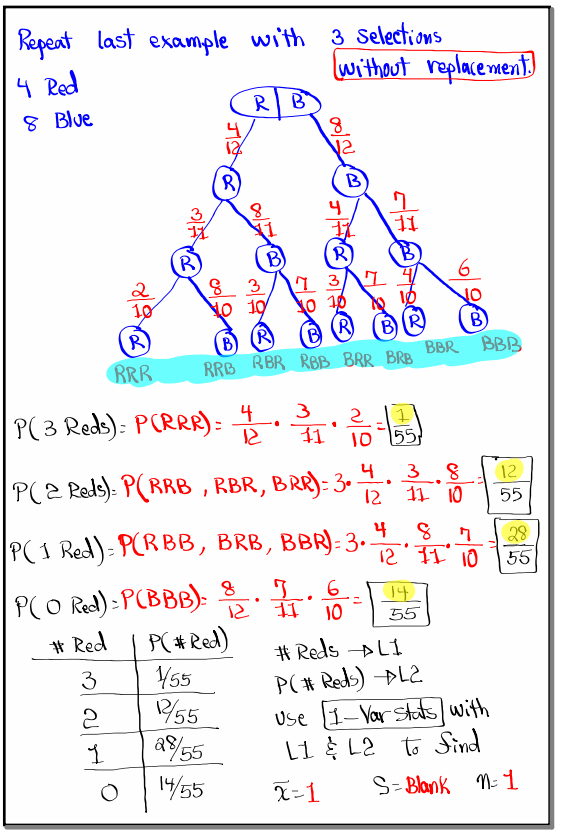
$P(1 \text{ Red}) = P(RB \text{ or } BR) = 2 \cdot \frac{4}{12} \cdot \frac{8}{11} = \boxed{\frac{16}{33}}$

$P(0 \text{ Red}) = P(BB) = \frac{8}{12} \cdot \frac{7}{11} = \boxed{\frac{14}{33}}$

# Red	P(#Red)
2	1/11
1	16/33
0	14/33

#Red → L1
P(#Red) → L2
Use 1-Var Stats with L1 & L2
to find
$\bar{x} = .\overline{6}$ S = Blank $n = 1$

Mar 15-7:49 AM


Repeat last example with 3 selections without replacement.
4 Red
8 Blue
R B
RRR RRB RBR RBB BRR BRB BBR BBB
P(3 Reds) = P(RRR) = 4/12 · 3/11 · 2/10 = 1/55
P(2 Reds) = P(RRB, RBR, BRR) = 3 · 4/12 · 3/11 · 8/10 = 12/55
P(1 Red) = P(RBB, BRB, BBR) = 3 · 4/12 · 8/11 · 7/10 = 28/55
P(0 Red) = P(BBB) = 8/12 · 7/11 · 6/10 = 14/55
Red | P(# Red)
3 | 1/55
2 | 12/55
1 | 28/55
0 | 14/55
Reds → L1
P(# Reds) → L2
Use 1-Var Stats with L1 & L2 to find
x̄ = 1 S = Blank n = 1

Mar 15-7:58 AM