Statistics

Lecture 11

Feb 19-8:47 AM

Some Review:

A box has 3 Red, 7 White, and 15 Blue balls.

We take one ball randomly,

1) $P(\text{Blue ball}) = \frac{15}{25} = \frac{3}{5} = .6$

2) $P(\text{Red or White ball}) = \frac{3+7}{25} = \frac{10}{25} = \frac{2}{5} = .4$

3) $P(\text{Red and White ball}) = \frac{0}{25} = 0$

Impossible event

4) $P(\overline{\text{White Ball}}) = 1 - P(\text{White ball})$

$= 1 - \frac{7}{25} = .72 = \frac{18}{25}$

1 ▭ 7 ÷ 25 enter .72 MATH 1:▶Frac Enter

Nov 8-7:22 AM

Given $P(A)=.35$, $P(B)=.45$, $P(A \text{ and } B)=.2$

1) $P(\overline{A})=1-P(A)=.65$

2) $P(\overline{B})=1-P(B)=.55$

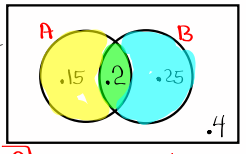
3) $P(\overline{A \text{ and } B})=1-P(A \text{ and } B)=.8$ Total = 1

$=1-.2=$

4) Construct the Venn Diagram

$.35-.2=.15$

$.45-.2=.25$



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

$=.35+.45-.2=.6$

6) $P(A \text{ only or } B \text{ only})=.15+.25=.4$

Nov 8-7:30 AM

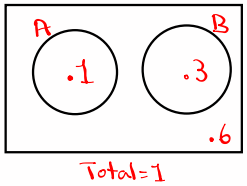
Given $P(A)=.1$, $P(B)=.3$, A and B are mutually Exclusive events. Disjoint events

1) $P(\overline{A})=1-.1=.9$

2) $P(\overline{B})=1-.3=.7$

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

4) Draw Venn Diagram.



Total = 1

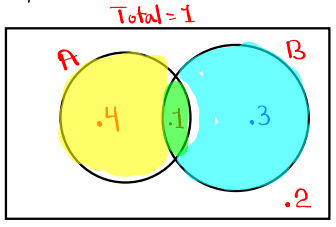
5) $P(A \text{ or } B)=P(A)+P(B)-P(A \text{ and } B)$

$=.1+.3-0=.4$

Nov 8-7:40 AM

Complete the Venn Diagram below

Total = 1



1) P(A only) = .4

2) P(A) = .4 + .1 = .5

3) P(B only) = .3

4) P(B) = .1 + .3 = .4

5) P(A and B) = .1

6) P(A or B)
= .5 + .4 − .1 = .8

7) P(A only OR B only) = .4 + .3 = .7

Nov 8-7:49 AM

De Morgan's Law:

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

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

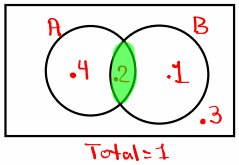
Given P(A) = .6 , P(B) = .3 , P(A and B) = .2

1) P(A or B) = P(A) + P(B) − P(A and B)
= .6 + .3 − .2 = .7

2) $P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .7 = .3$
De Morgan's Law

3) $P(\overline{A} \text{ or } \overline{B}) = P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .2 = .8$

4) Make Venn Diagram
.6 − .2 = .4
.3 − .2 = .1



Total = 1

5) P(A or B, not both)
= P(A only OR B only) = .4 + .1 = .5

Nov 8-7:59 AM

$P(A) = .4$

$P(B) = .5$

$P(A \text{ or } B) = .95$

1) $P(\overline{A}) = 1 - .4 = \boxed{.6}$

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

3) $P(A \text{ and } B)$

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

$.95 = .4 + .5 - P(A \text{ and } B)$

$.95 = .9 - P(A \text{ and } B)$

$P(A \text{ and } B) = .9 - .95$

$P(A \text{ and } B) = -.05$

Issue

Information is not accurate.

Nov 8-8:12 AM

$P(A) = .6$

$P(B) = .5$

$P(A \text{ or } B) = .95$

1) $P(\overline{A}) = 1 - .6 = \boxed{.4}$

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

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

Addition Rule

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

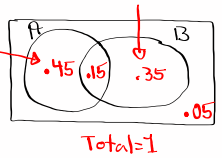
$.95 = .6 + .5 - P(A \text{ and } B)$

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

$= \boxed{.15}$

$.6 - .15 = .45$

$.5 - .15 = .35$



Total = 1

$P(A \text{ only OR } B \text{ only}) = .45 + .35 = \boxed{.8}$

$P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .95 = \boxed{.05}$

De Morgan's Law

$P(\overline{A} \text{ or } \overline{B}) = P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .15 = \boxed{.85}$

SG 11 ✓

Nov 8-8:12 AM

Introduction to odds: (SG 12)

odds notation in favor of event E are

$a : b$ (Always Reduce)

a: # E Can happen

b: # E Can not happen

20 Students, 8 males, 12 Females

odds in favor of Selecting male

Males : # Males

$8 : 12 \rightarrow 2 : 3$

8 ÷ 12 Math 1:▶Frac Enter $\frac{2}{3}$

Nov 8-8:58 AM

A box has 5 Red, 15 white, and 30 Blue balls.

odds in favor of Selecting a red ball are

Red : # Red

$5 : 45 \Rightarrow 1 : 9$

5 ÷ 45 Math 1:▶Frac Enter $\frac{1}{9}$

odds in favor of Selecting a white ball

White : # white

$15 : 35 \rightarrow \boxed{3 : 7}$

odds in favor of event E are $a : b$

odds against event E are $b : a$

Nov 8-9:03 AM

A standard deck of playing cards has 52 cards and 4 aces.

1) Find odds **in favor of** selecting an **Ace**

Ace : # Not Ace

4 : 48 → 1 : 12

2) Find odds **against** selecting an **Ace**

12 : 1

Nov 8-9:08 AM

How to find $P(E)$ & $P(\bar{E})$ when odds are $a : b$ in favor of event E:

$$P(E) = \frac{a}{a+b} \quad , P(\bar{E}) = \frac{b}{a+b}$$

ex: odds in favor of event E are 3 : 37.

1) odds against → 37 : 3

2) $P(E) = \frac{3}{3+37} = \frac{3}{40}$ 3) $P(\bar{E}) = \frac{37}{3+37} = \frac{37}{40}$

Nov 8-9:12 AM

odds in favor of LA Lakers win the NBA championship this year are 4 : 21.

1) odds against $\boxed{21 : 4}$

2) $P(W) = \frac{4}{4+21} = \boxed{\frac{4}{25}}$

3) $P(\overline{W}) = \frac{21}{4+21} = \boxed{\frac{21}{25}}$

Nov 8-9:16 AM

How to find odds in favor of event E when P(E) is given:

odds in favor of event E are

$P(E) : P(\overline{E})$ Always Reduce

ex: $P(E) = .12$

1) $P(\overline{E}) = 1 - .12 = \boxed{.88}$

2) odds in favor of event E.
$P(E) : P(\overline{E})$ $.12 : .88 \rightarrow \boxed{3 : 22}$

3) odds against event E. $\rightarrow \boxed{22 : 3}$

Nov 8-9:19 AM

Given $P(E) = 2.5\%$

1) $P(E)$ in decimal. $2.5 \div 100$ enter

$\frac{2.5}{100} = .025$

2) $P(\bar{E})$ in decimal.

$= 1 - P(E) = 1 - .025 = .975$

3) $P(\bar{E})$ in %.

$.975(100)\% = 97.5\%$

4) odds in favor of event E.

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

$.025 : .975$

$1 : 39$

5) odds against event E.

$39 : 1$

Page 1 & Page 2 in SG 12 except last problem on Page 2.

Nov 8-9:25 AM

Complete the chart below

class limits	class MP	class F
18 – 30	24	5
31 – 43	37	12
44 – 56	50	13
57 – 69	63	10

1) # classes

4

2) Sample Size

$n = \Sigma f = 5+12+13+10 = 40$

3) class width

13

Class MP → L1

Class F → L2

Use 1-Var Stats with L1 & L2 to find

$\bar{x} = 46.1$

$s = 12.900$

$n = 40$

12.899 | 6

5 or more

Add 1

Find s^2 in reduced fraction

VARS | 5: Statistics | 3: S_x | x^2

MATH | 1: ▶Frac | Enter

$\frac{832}{5}$

Nov 8-9:32 AM

Use Your Calc to Find

8!

8 MATH → PRB ↓ 4:! Enter 40320

50! 50 ⇒ 3.041 × 10^{64}

E 64

Scientific Notation

100! = 9.333×10^{157}

My Calc

ERR: Overflow

Finish
SG 10, and 11

Work on
SG 12 (#1-#6)

Nov 8-9:45 AM