Statistics

Lecture 10

Feb 19-8:47 AM

Class QZ 5

Given $P(A) = .025$

1) Write $P(A)$ in % notation

$P(A) = .025(100)\% = 2.5\%$

2) Write $P(A)$ in reduced fraction

.025 [Math] [1:▶Frac] [Enter] $\frac{1}{40}$

3) Find $P(\bar{A})$ in decimal.

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

Complement Rule

Oct 6-10:33 AM

Given $P(A)=.72$, $P(B)=.32$, $P(A \text{ and } B)=.12$

1) $P(\overline{A}) = 1 - P(A) = 1 - .72 = \boxed{.28}$

2) $P(\overline{B}) = 1 - P(B) = 1 - .32 = \boxed{.68}$

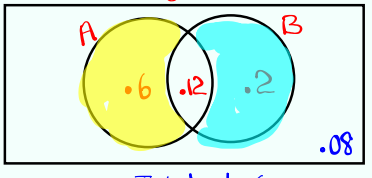
3) $P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .12 = \boxed{.88}$

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

Addition Rule $= .72 + .32 - .12 = \boxed{.92}$

5) Construct Venn Diagram

P(A only) = $.72 - .12 = \boxed{.6}$



P(B only) = $.32 - .12$

Total = 1 ✓

6) $P(A \text{ only OR } B \text{ only}) = .6 + .2 = \boxed{.8}$

Oct 6-11:00 AM

$P(A) = .6$, $P(B) = .35$, A and B are Mutually Exclusive events

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

2) $P(\overline{B}) = 1 - P(B) = 1 - .35 = \boxed{.65}$

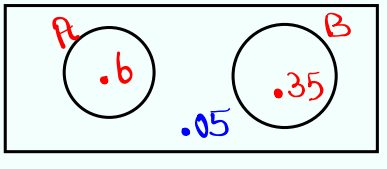
3) $P(A \text{ and } B) = 0$

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

$= .6 + .35 - 0 = \boxed{.95}$

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

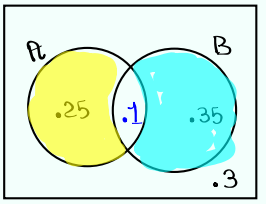
6) Construct Venn Diagram



Total = 1 ✓

Oct 6-11:12 AM

Complete the Venn Diagram below



Total = 1 ✓

1) P(A only) = .25

2) P(A) = .35

3) P(B only) = .35

4) P(B) = .45

5) P(A and B) = .1

6) P(not (A and B)) = 1 − .1 = .9

7) P(A or B) = P(A) + P(B) − P(A and B) = .35 + .45 − .1 = .7

8) P(not (A or B)) = 1 − .7 = .3

9) P(A only OR B only) = .25 + .35 = .6

10) P(A only and B only) = 0 (no overlap)

M.E. disjointed Events

Oct 6-11:25 AM

De Morgan's Law:

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

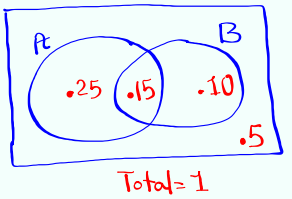
$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B})$

P(A) = .4 , P(B) = .25 , P(A and B) = .15

Construct Venn Diagram

.4 − .15 = .25

.25 − .15 = .1



Total = 1

P(A or B)

= .4 + .25 − .15 = .5

$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .5 = .5$

De Morgan's Law

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

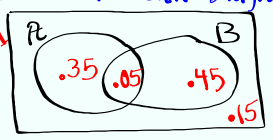
Oct 6-11:42 AM

P(A only) = .35 ✓

P(B only) = .45 ✓

P(A and B) = .05 ✓

1) Construct Venn Diagram



2) P(A) = .4 3) P(B) = .5

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .4 + .5 - .05$
$= \boxed{.85}$

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

De Morgan's Law

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

SG 10 ✓

SG 11 ✓

Oct 6-11:52 AM

Intro. to odds:

Odds in favor of event E are

E happens : # $\bar{E}$ happens

Always Reduce

I flipped a coin 25 times. It landed tails 10 times.

odds in favor of landing tails

tails : # $\overline{\text{tails}}$

10 : 15

Reduce by 5 → 2 : 3

10 ÷ 15 Math 1:▶Frac Enter $\frac{2}{3}$

Oct 6-12:04 PM

Standard deck of playing cards

52 cards, 26 Red, 12 faces, 4 aces.

odds in favor of drawing

1) Red card

Red : # $\overline{\text{Red}}$

26 : 26

1 : 1

2) Ace

Aces : # $\overline{\text{Aces}}$

4 : 48

1 : 12

Oct 6-12:09 PM

odds in favor of event E are

$a : b$

# of times E happens

# of times $\overline{E}$ happens

in $(a+b)$ Total # of times

odds against E are $b : a$

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

Oct 6-12:16 PM

Given odds in favor of event E are

3 : 17

1) Find $P(E) = \frac{3}{3+17} = \boxed{\frac{3}{20}}$

2) Find $P(\bar{E}) = \frac{17}{3+17} = \boxed{\frac{17}{20}}$

3) Find odds against E.

$\boxed{17 : 3}$

Oct 6-12:19 PM

Given odds in favor of event E are

1 : 39

40 times total

1 E happens

39 E does not happen

$P(E) = \boxed{\frac{1}{40}}$ $P(\bar{E}) = \boxed{\frac{39}{40}}$

odds against E $\boxed{39 : 1}$

Oct 6-12:22 PM

How to find odds when prob. is given,

If we know $P(E)$, odds in favor of E are $P(E) : P(\bar{E})$

Always simplify to whole #s.

ex: Suppose $P(E) = .125$

1) $P(\bar{E}) = 1 - .125 = \boxed{.875}$

2) odds in favor of event E.

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

$.125 : .875$ → $\boxed{1:7}$

3) odds against E. $\boxed{7:1}$

Oct 6-12:25 PM

$P(E) = .85$

1) $P(\bar{E}) = 1 - .85 = \boxed{.15}$

2) odds in favor of event E.

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

$.85 : .15$ → $\boxed{17:3}$

3) odds against event E. $\boxed{3:17}$

Oct 6-12:30 PM