Statistics

Lecture 6

Feb 19-8:47 AM

Addition Rule SG 11

Keyword OR

Single Action Event

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

Ex: $P(A) = .2$, $P(B) = .7$, $P(A \text{ and } B) = .1$

1) $P(\overline{A}) = 1 - P(A) = 1 - .2 = .8$ 2) $P(\overline{B}) = 1 - P(B) = 1 - .7 = .3$

Complement Rule

3) $P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .1 = .9$

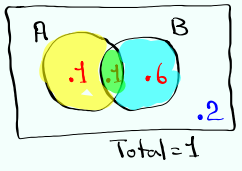
4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

Addition Rule $= .2 + .7 - .1 = .8$

Venn Diagram

$P(A \text{ only}) = .2 - .1 = .1$

$P(B \text{ only}) = .7 - .1 = .6$



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

Complement Rule

Oct 4-11:35 AM

$P(HB) = .45$

$P(FF) = .35$

$P(HB \text{ and } FF) = .2$

both (overlap)

1) $P(\overline{HB}) = 1 - .45 = .55$

Complement Rule

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

$P(HB \text{ or } FF) = P(HB) + P(FF) - P(HB \text{ and } FF)$

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

$P(\overline{HB \text{ and } FF}) = 1 - P(HB \text{ and } FF) = 1 - .2 = .8$

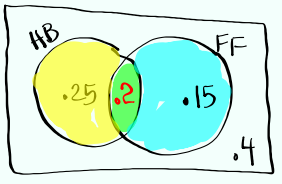
Complement Rule

$P(\overline{HB \text{ or } FF}) = 1 - P(HB \text{ or } FF) = 1 - .6 = .4$

Construct Venn Diagram

$P(HB \text{ only}) = .45 - .2 = .25$

$P(FF \text{ only}) = .35 - .2 = .15$



Total = 1

$P(HB \text{ or } FF \text{ but not both}) = .25 + .15 = .4$

Oct 4-11:46 AM

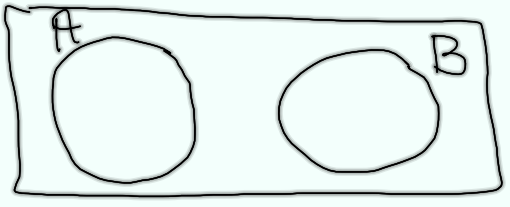
Mutually Exclusive Events

Disjointed Events

they don't happen together

No overlap

IF A and B are M.E.E. $\iff P(A \text{ and } B) = 0$



Oct 4-11:57 AM

$P(A)=.3$, $P(B)=.5$, A and B are M.E.

Disjointed events

1) $P(\overline{A}) = 1 - P(A) = .7$

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

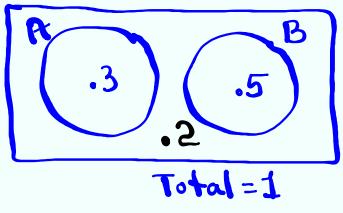
3) $P(A \text{ and } B) = 0$

4) $P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - 0 = 1$

5) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .3 + .5 - 0 = .8$

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

Construct Venn Diagram



Oct 4-12:00 PM

De Morgan's Law:

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

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

$P(A) = .4$ $P(B) = .8$ $P(A \text{ and } B) = .3$

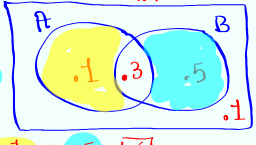
1) $P(\overline{A}) = 1 - .4 = .6$ 2) $P(\overline{B}) = 1 - .8 = .2$

3) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .4 + .8 - .3 = .9$

4) Construct Venn Diagram Total = 1

$P(A \text{ only}) = .4 - .3 = .1$

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



$P(A \text{ only} \text{ OR } B \text{ only}) = .1 + .5 = .6$

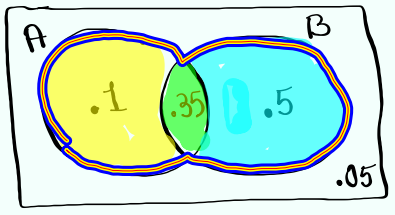
$P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .9 = .1$

De Morgan's Law

$P(\overline{A} \text{ or } \overline{B}) = P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .3 = .7$

Oct 4-12:10 PM

Complete the Venn Diagram below:



1) P(A and B) = .35

2) P($\overline{A \text{ and } B}$) = .65

3) P(A only) = .1

4) P(A) = .45

5) P(B only) = .5

6) P(B) = .85

7) P(A or B) = .95

8) P($\overline{A \text{ or } B}$) = .05

9) P($\overline{A}$ and $\overline{B}$) = P($\overline{A \text{ or } B}$) = .05

De Morgan's Law

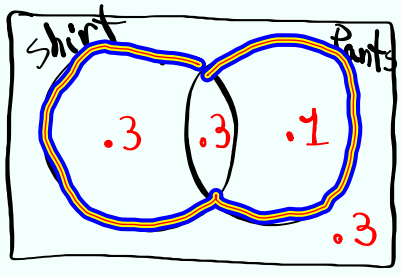
10) P($\overline{A}$ or $\overline{B}$) = P($\overline{A \text{ and } B}$) = .65

Oct 4-12:21 PM

P(shirt) = .6 ✓

P(pants) = .4 ✓

P(shirt and Pants) = .3



Total = 1

1) Construct Venn Diagram

2) P(Shirt or Pants) = P(Shirt) + P(Pants) − P(both)

Addition Rule

= .6 + .4 − .3

= .7

Sec 11

Oct 4-12:31 PM