

Statistics

Lecture 6



Feb 19-8:47 AM

SG 11

Addition Rule

Keyword OR

Single action event

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

both

ex: $P(A) = .3$, $P(B) = .6$, $P(A \text{ and } B) = .2$

1) $P(\bar{A}) = 1 - P(A) = 1 - .3 = .7$
Complement Rule

2) $P(\bar{B}) = 1 - P(B) = 1 - .6 = .4$

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

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
Addition Rule
 $= .3 + .6 - .2 = .7$

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

6) Construct Venn Diagram

$P(A \text{ only}) = .3 - .2 = .1$

$P(B \text{ only}) = .6 - .2 = .4$

Total = 1

Oct 4-8:01 AM

$$P(\text{Coffee}) = .75$$

$$P(\text{Donuts}) = .35$$

$$P(\text{Coffee and Donuts}) = .15$$

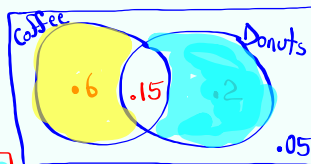
$$1) P(\overline{\text{Coffee}}) = 1 - P(\text{Coffee}) = 1 - .75 = \boxed{.25}$$

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

$$3) P(\text{Coffee or Donuts}) = P(\text{Coffee}) + P(\text{Donuts}) - P(\text{Coffee and Donuts})$$

$$= .75 + .35 - .15 = \boxed{.95}$$

Construct Venn Diagram



$$P(\text{Coffee only}) = .75 - .15 = \boxed{.6}$$

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

$$P(\text{Coffee or donuts, not both}) = .6 + .2 = \boxed{.8}$$

Oct 4-8:12 AM

Mutually Exclusive Events

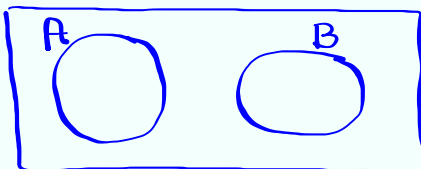
Disjoint events

⇔ They do not happen together

If A and B are

M. E. E.

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



Oct 4-8:21 AM

$P(A) = .4$, $P(B) = .5$, $A \dot{\bar{e}} B$ are M.E.E.

Disjointed Events

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

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

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

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

5) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .4 + .5 - 0 = \boxed{.9}$

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

7) Construct Venn Diagram

Oct 4-8:24 AM

De Morgan's Law

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

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

$P(A) = .35$, $P(B) = .55$ $P(A \text{ and } B) = .25$

1) Construct Venn Diagram

$P(A \text{ only}) = .35 - .25 = .1$

$P(B \text{ only}) = .55 - .25 = .3$

Total = 1

2) $P(\overline{A \text{ and } B}) = 1 - P(A \text{ and } B) = 1 - .25 = \boxed{.75}$

3) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .35 + .55 - .25 = \boxed{.65}$

4) $P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .65 = \boxed{.35}$

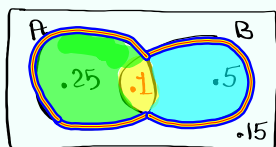
$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = \boxed{.35}$

De Morgan's Law

$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = \boxed{.75}$

Oct 4-8:32 AM

Complete the Venn Diagram below



1) $P(A \text{ and } B) = .1$

2) $P(A \text{ only}) = .25$

3) $P(A) = .35$

Total = 1

4) $P(B \text{ only}) = .5$

5) $P(B) = .6$

6) $P(A \text{ or } B) = .85$

$P(A) + P(B) - P(A \text{ and } B)$
 $= .35 + .6 - .1$
 $= .85$

7) $P(\overline{A \text{ or } B}) = .15$

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

9) $P(\overline{A} \text{ and } \overline{B}) = P(\overline{A \text{ or } B}) = .15$

De Morgan's Law

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

SG 11 ✓

Oct 4-8:42 AM