Statistics

Lecture 18

Feb 19-8:47 AM

Complement Rule

$$P(\bar{E}) = 1 - P(E)$$

$$P(E) = 1 - P(\bar{E})$$

$$P(E) + P(\bar{E}) = 1$$

Given $P(E) = 0.025$

1) Find $P(E)$ in reduced fraction.

.025 MATH 1:▶Frac Enter $\frac{1}{40}$

2) Find $P(E)$ in percent notation.

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

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

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

in fraction $\frac{39}{40}$, in % 97.5%

Sep 30-8:51 AM

Consider a deck of cards

52 Cards & 12 face cards.

Draw one Card,

$P(\text{Face}) = \frac{12}{52} = \boxed{\frac{3}{13}}$

$P(\overline{\text{Face}}) = \frac{40}{52} = \boxed{\frac{10}{13}}$

$P(\text{Face}) + P(\overline{\text{Face}}) = 1$

$\frac{3}{13} + \frac{10}{13} = \frac{13}{13} = \boxed{1}$

Sep 30-8:59 AM

Addition Rule

SG 11

Keyword OR

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

Single Action event

Suppose $P(A) = .7$, $P(B) = .4$ – $P(A \text{ and } B) = .2$

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

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

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

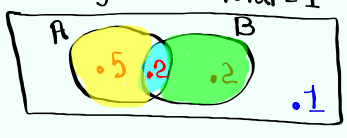
$= .7 + .4 - .2$

$= \boxed{.9}$

Venn Diagram ✓ Total = 1

$.7 - .2 = .5$ ← P(A only)

$.4 - .2 = .2$ ← P(B only)



Sep 30-9:03 AM

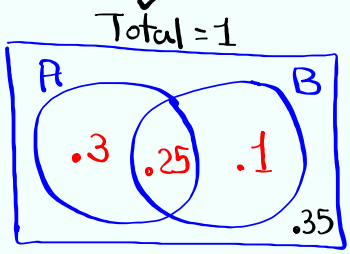
$P(A) = .55$

$P(B) = .35$

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

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

$= .55 + .35 - .25 = \boxed{.65}$



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

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

$P(A \text{ only}) = .55 - .25 = .3$ $P(B \text{ only}) = .35 - .25 = .1$

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

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

Sep 30-9:11 AM

$P(HB) = .4$

$P(FF) = .3$

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

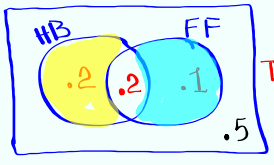
1) $P(\overline{HB}) = 1 - .4 = \boxed{.6}$

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

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

$= .4 + .3 - .2 = \boxed{.5}$

4) Venn Diagram



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

6) $P(\overline{HB \text{ or } FF}) = 1 - P(HB \text{ or } FF) = 1 - .5 = \boxed{.5}$

7) $P(HB \text{ only OR } FF \text{ only, not both}) = .2 + .1 = \boxed{.3}$

Sep 30-9:21 AM

Mutually Exclusive Events

"Disjointed Events"

No overlap

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

$P(A) = .15$, $P(B) = .65$, A & B are M.E.E.

$P(\bar{A}) = 1 - .15 = \boxed{.85}$ $P(\bar{B}) = 1 - .65 = \boxed{.35}$

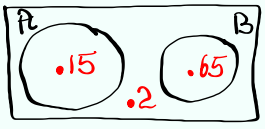
$P(A \text{ and } B) = \boxed{0}$

$P(A \text{ or } B)$

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

$= .15 + .65 - 0 = \boxed{.8}$

Draw Venn Diagram



Total = 1

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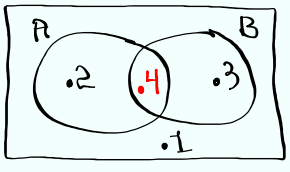
De Morgan's Law

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

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

Complete the Venn Diagram below



Total = 1

$P(A) = \boxed{.6}$

$P(B) = \boxed{.7}$

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

$P(A \text{ or } B) = \boxed{.9}$

$P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = 1 - .4 = \boxed{.6}$

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

Sep 30-9:45 AM

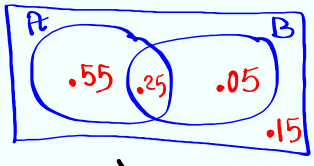
$P(A) = .8$

$P(B) = .3$

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

1) Make Venn Diagram

✓ Total = 1



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

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

$.8 + .3 - .25 = \boxed{.85}$

De Morgan's Law

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

$= 1 - .85 = \boxed{.15}$

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

SG 11 ✓

Sep 30-9:53 AM