Statistics

Lecture 6

Feb 19-8:47 AM

Given $P(A) = .125$

1) write $P(A)$ in % notation.

$.125(100)\% = \boxed{12.5\%}$

2) write $P(A)$ in reduced fraction.

$.125$ $\boxed{\text{Math}}$ $\boxed{1: \blacktriangleright \text{Frac}}$ $\boxed{\text{Enter}}$ $\boxed{\frac{1}{8}}$

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

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

4) find $\frac{P(A)}{P(\bar{A})}$ in reduced fraction

$.125 \boxed{\div} .875$ $\boxed{\text{Math}}$ $\boxed{1: \blacktriangleright \text{Frac}}$ $\boxed{\text{Enter}}$

$\frac{.125}{.875} = \boxed{\frac{1}{7}}$

Oct 7-6:51 PM

SG11

Given $P(A)=.55$ $P(B)=.4$

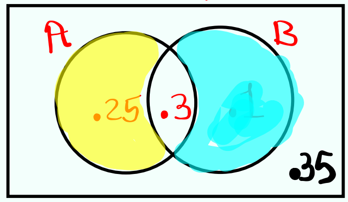
$P(A \text{ and } B)=.3$

1) Construct Venn Diagram

Total = 1 ✓

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

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



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

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

$=.55+.4-.3=\boxed{.65}$

3) $P(A\text{ only or } B\text{ only})=.25+.1=\boxed{.35}$

4) $P(\underbrace{A\text{ only and } B\text{ only}}_{\text{Impossible event}})=\boxed{0}$

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Addition Rule

SG11

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

$\uparrow$ Addition Rule

over lap

$P(A)=.7$, $P(B)=.5$, $P(\overset{\text{over lap}}{A \text{ and } B})=.4$

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

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

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

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

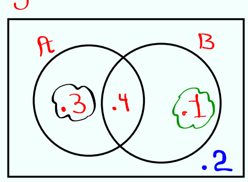
$=.7+.5-.4=\boxed{.8}$ ✓

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

6) Construct Venn Diagram.

$P(A\text{ only})=.7-.4=.3$

$P(B\text{ only})=.5-.4=.1$



Total = 1 ✓

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

$=.3+.1=\boxed{.4}$

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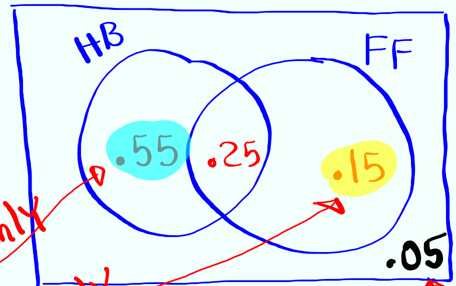
$P(HB) = .8$

$P(FF) = .4$

$P(HB \text{ and } FF) = .25$



$.8 - .25 = \boxed{.55}$ HB only

$.4 - .25 = \boxed{.15}$ FF only

Total = 1 ✓

1 − .95

$P(HB \text{ or } FF) = .55 + .25 + .15 = \boxed{.95}$ ✓

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

$= .8 + .4 - .25 = \boxed{.95}$ ✓

$P(HB \text{ only OR } FF \text{ only}) = .55 + .15 = \boxed{.7}$

Oct 7-7:18 PM

If A & B do not overlap,

they are called $\underbrace{\text{Mutually Exclusive events}}_{\text{Disjointed Events}}$

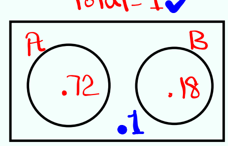
$$P(\underbrace{A \text{ and } B}_{\text{Both}}) = 0$$

Given $P(A) = .72$, $P(B) = .18$, A & B are M.E.E.

$P(\bar{A}) = 1 - .72 = \boxed{.28}$ $\quad P(\bar{B}) = 1 - .18 = \boxed{.82}$ $\quad P(A \text{ and } B) = \boxed{0}$

Total = 1 ✓

Construct Venn Diagram



$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .72 + .18 - 0 = \boxed{.9}$

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

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De Morgan's Law:

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

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

Given $P(A) = .6$, $P(B) = .5$, $P(A \text{ and } B) = .3$

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

$= .6 + .5 - .3 = \boxed{.8}$

2) Construct Venn Diagram.

$.6 - .3 = .3$

$.5 - .3 = .2$

Total = 1 ✓

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

De Morgan's Law

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

5) $P(A \text{ only or } B \text{ only}) = .3 + .2 = \boxed{.5}$

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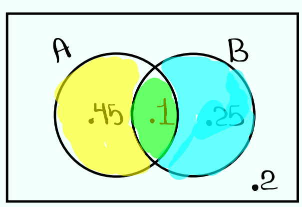
Complete the Venn Diagram below



Total = 1 ✓

1) $P(A \text{ only}) = \boxed{.45}$

2) $P(A) = \boxed{.55}$

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

4) $P(B) = \boxed{.35}$

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

6) $P(A \text{ or } B) = \boxed{.8}$

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

De Morgan's Law

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

9) $P(A \text{ only or } B \text{ only}) = .45 + .25 = \boxed{.7}$

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

✓ SG 11

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SG 12

Intro. to odds:

odds in favor of event E are

$$a : b$$

\# times E happens

\# times $\overline{E}$ happens

in $(a+b)$ Total times.

I flipped a coin 40 times, it landed tails 25 times.

25 tails : 15 $\overline{\text{tails}}$

Simplify

5 : 3

odds in favor of landing tails are

5 : 3

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What are the odds of drawing an Ace from a full deck of playing cards?

4 Aces : 48 $\overline{\text{Aces}}$

Divide by 4

$\boxed{1 : 12}$

If odds in favor of event E are $a:b$, then odds against E are $b:a$.

1) odd in favor of drawing a face card

12 face : 40 $\overline{\text{face}}$

$\boxed{3 : 10}$

2) odds against drawing a face card.

$\boxed{10 : 3}$

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How to find $P(E)$ and $P(\overline{E})$ if we have the odds in favor of E.

If odds in favor of E are $a:b$,

then $P(E) = \dfrac{a}{a+b}$, $P(\overline{E}) = \dfrac{b}{a+b}$

Suppose odds in favor of Dodgers to win the World Series are 5:3,

$P(\text{win}) = \dfrac{5}{5+3} = \dfrac{5}{8}$

$P(\overline{\text{win}}) = \dfrac{3}{5+3} = \dfrac{3}{8}$

Oct 7-8:19 PM

How to find odd in favor of event E if P(E) is given.

odds in favor of event E are

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

Always simplify.

Suppose Prob. that LA Lakers win the championship this year is .125.

$P(W) : P(\overline{W})$ $\boxed{1:7}$

$.125 : .875$

$.125 \boxed{\div} .875$ $\boxed{\text{Math}}$ $\boxed{\text{1:}\blacktriangleright\text{Frac}}$ $\boxed{\text{Enter}}$ $\dfrac{1}{7}$

Oct 7-8:23 PM

Multiplication Rule

Key word AND

Multiple Action event

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

A happens, then B happens

Case I: Independent Events

one outcome does not change the prob. of next outcome

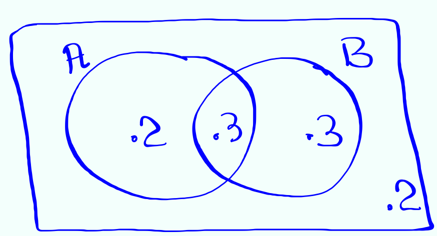
$$\boxed{P(A \text{ and } B) = P(A) \cdot P(B)}$$

Oct 7-8:29 PM

Given $P(A) = .5$, $P(B) = .6$, A & B are independent events

$$P(A \text{ and } B) = P(A) \cdot P(B) = (.5)(.6) = \boxed{.3}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) = .5 + .6 - .3 = \boxed{.8}$$



Total = 1

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Suppose $P(\text{tails}) = .6$

flip this coin twice

P(land tails on both flips)

$P(T \text{ and } T) = (.6)(.6) = \boxed{.36}$

$P(\text{Boy}) = .5$

take 3 newborn babies

$P(\text{All Boys}) = P(B) \cdot P(B) \cdot P(B)$

$= (.5)(.5)(.5) = \boxed{.125}$

Oct 7-8:37 PM

Draw 2 Cards from a Standard deck of playing Cards, $\boxed{\text{with replacement}}$

$P(\underbrace{\text{Both Aces}}_{\text{Rare event}}) = P(\text{Ace}) \cdot P(\text{Ace})$

$= \frac{4}{52} \cdot \frac{4}{52} = \boxed{\frac{1}{169}} \approx \boxed{.006}$ ✓ $\leq .05$

4 $\boxed{\div}$ 52 $\boxed{\times}$ 4 $\boxed{\div}$ 52 $\boxed{\text{Math}}$ $\boxed{\text{1:▶Frac}}$ $\boxed{\text{Enter}}$

$\boxed{\text{Math}}$ $\boxed{\text{2:▶Dec}}$ $\boxed{\text{Enter}}$

$P(\underbrace{\text{Both Face Cards}}_{\text{not rare}}) = P(\text{Face}) \cdot P(\text{Face})$

$= \frac{12}{52} \cdot \frac{12}{52} = \boxed{\frac{9}{169}} \approx \boxed{.053}$ $> .05$

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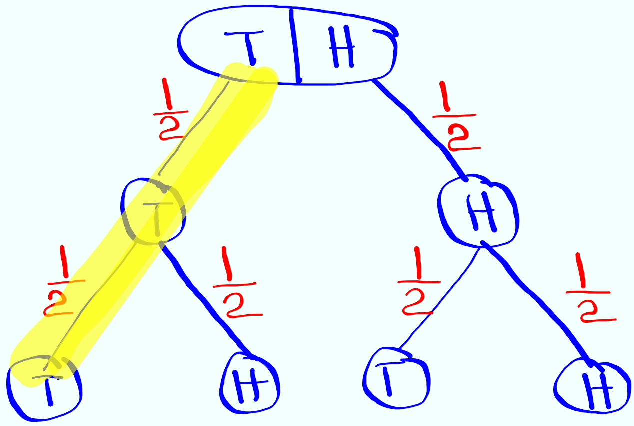
Multiplication Rule with Tree diagram

Flip a fair Coin Twice



$P(\text{Both tails}) = \frac{1}{2} \cdot \frac{1}{2} = \boxed{\frac{1}{4}}$

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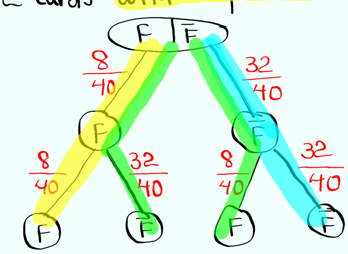
Suppose a deck of Cards has 40 Cards with 8 face Cards.

Draw 2 Cards with replacement



$P(\text{Two face Cards}) = \frac{8}{40} \cdot \frac{8}{40} = \boxed{\frac{1}{25}}$

$P(\text{No face Cards}) = \frac{32}{40} \cdot \frac{32}{40} = \boxed{\frac{16}{25}}$ Total=1

$P(1\text{face}, 1\overline{\text{face}}) = 2 \cdot \frac{8}{40} \cdot \frac{32}{40} = \boxed{\frac{8}{25}}$

Watch all videos on the right hand Side of Study Guides

SG 12 ✓

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