

Statistics

Lecture 12



Feb 19-8:47 AM

Given odds in favor of event E are 1:19.

1) what are odds against E ?

19:1

2) Find $P(E)$

$$= \frac{1}{1+19} = \boxed{\frac{1}{20}}$$

3) Find $P(\bar{E})$

$$= \frac{19}{1+19} = \boxed{\frac{19}{20}}$$

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

$$\frac{1}{20} + \frac{19}{20} = \frac{20}{20} = 1 \checkmark$$

Oct 15-10:35 AM

Suppose $P(E) = .24$

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

$$.24 = .24(100)\% = \boxed{24\%}$$

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

$$.24 \text{ [Math] [1:] [Frac] [Enter] } \boxed{\frac{6}{25}}$$

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

$$= 1 - .24 = \boxed{.76}$$

4) Find odds in favor of event E.

$$P(E) : P(\bar{E}) \quad .24 : .76 \rightarrow \boxed{6 : 19}$$

$$.24 \text{ [÷] .76 [Math] [1:] [Frac] [Enter] } \boxed{\frac{6}{19}}$$

5) Find odds against event E.

$$\boxed{19 : 6}$$

Oct 15-10:39 AM

Given $P(A) = .4$, $P(B) = .3$

A & B are independent events

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

$$2) P(\bar{B}) = 1 - .3 = \boxed{.7}$$

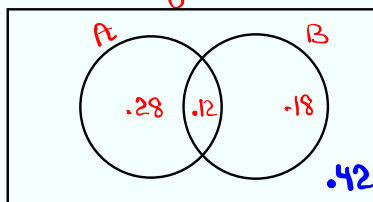
$$3) P(A \text{ and } B) = P(A) \cdot P(B) \\ = (.4)(.3) = \boxed{.12}$$

$$4) P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B) \\ = .4 + .3 - .12 = \boxed{.58}$$

5) Construct Venn Diagram

$$.4 - .12 = .28$$

$$.3 - .12 = .18$$



Total = 1 ✓

Use DeMorgan's Law to Find

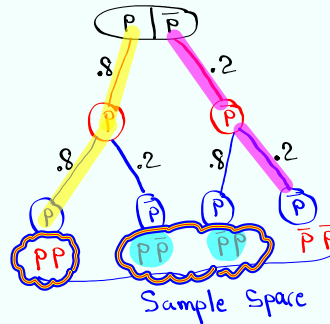
$$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - .58 = \boxed{.42}$$

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

Oct 15-10:45 AM

Prob. that any student pass the first exam is .8

Two students are randomly Selected.



$$P(PP) = (.8)(.8) = .64$$

$$P(\bar{P}\bar{P}) = (.2)(.2) = .04$$

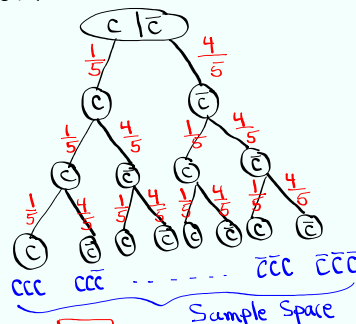
$$P(\text{at least 1 pass}) = P(P\bar{P} \text{ or } \bar{P}P) = (.8)(.2) + (.2)(.8) = .32$$

$$P(\text{at least 1 passes}) = 1 - P(\bar{P}\bar{P}) = 1 - .04 = .96$$

Oct 15-10:56 AM

You are taking a multiple-choice quiz and making random guesses.

Quiz has 3 questions and each question has 5 choices with only 1 correct choice



$$P(CCC) = \frac{1}{5} \cdot \frac{1}{5} \cdot \frac{1}{5} = \frac{1}{125}$$

$$P(\bar{C}\bar{C}\bar{C}) = \frac{4}{5} \cdot \frac{4}{5} \cdot \frac{4}{5} = \frac{64}{125}$$

$$P(\text{at least 1 correct guess})$$

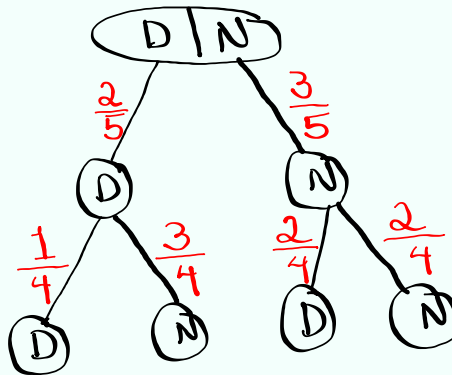
$$= 1 - P(\bar{C}\bar{C}\bar{C}) = 1 - \frac{64}{125} = \frac{61}{125}$$

↑ Total Prob.



Oct 15-11:06 AM

A piggy bank has 2 dimes & 3 nickels.
take 2 coins, **No replacement.**



$$P(DD) = \frac{2}{5} \cdot \frac{1}{4} = \frac{1}{10} = \boxed{.1} \quad P(NN) = \frac{3}{5} \cdot \frac{2}{4} = \frac{3}{10} = \boxed{.3}$$

$$P(1D \& 1N) = P(DN \text{ or } ND) = 2 \cdot \frac{2}{5} \cdot \frac{3}{4} = \frac{3}{5} = \boxed{.6}$$

Oct 15-11:18 AM

Consider a full deck of playing cards,
52 cards, 26 Red, 12 face, 4 aces.
Draw 3 cards, No replacement

$$P(\text{First Face then 2 aces}) = \frac{12}{52} \cdot \frac{4}{51} \cdot \frac{3}{50} = \boxed{\frac{6}{5525}}$$

$$P(\text{First Ace followed by 2 Faces}) = \frac{4}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} = \boxed{\frac{22}{5525}}$$

$P(\text{get a red card, followed by two black cards}) =$

$$\frac{26}{52} \cdot \frac{26}{51} \cdot \frac{25}{50} = \boxed{\frac{13}{102}}$$

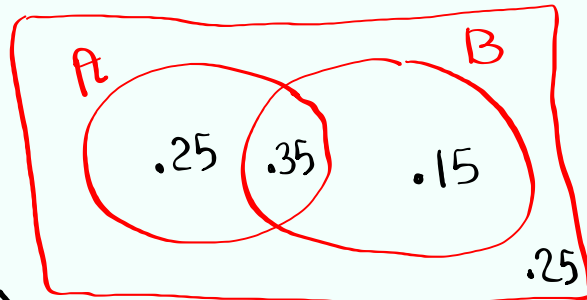
Oct 15-11:26 AM

$$P(A) = .6$$

1) Construct Venn Diagram

$$P(B) = .5$$

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



$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.35}{.5} = \boxed{.7}$$

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.35}{.6} = \boxed{.583}$$

Oct 15-11:36 AM

$$P(\text{Shoes}) = .6$$

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

$$P(\text{Shoes} | \text{Socks}) = .8$$

$$P(\text{Shoes and Socks})$$

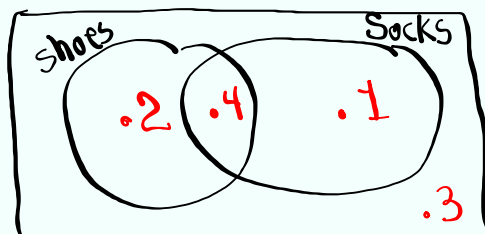
$$P(\text{Shoes} | \text{Socks}) = \frac{P(\text{Shoes and Socks})}{P(\text{Socks})}$$

$$.8 = \frac{P(\text{Shoes and Socks})}{.5}$$

Cross-Multiply

$$P(\text{Shoes and Socks}) = (.8)(.5)$$

$$= \boxed{.4}$$



$$P(\text{Socks} | \text{Shoes}) = \frac{.4}{.6} = \frac{4}{6} = \frac{2}{3} = \boxed{.667}$$

Oct 15-11:42 AM

You are the manger of a plant.

You just hired 3 Females and 5 males.

4 needed for morning shift.

3 " " afternoon " "

1 " " graveyard " "

Focus on afternoon shift,

$$P(\text{all females}) = \frac{3}{8} \cdot \frac{2}{7} \cdot \frac{1}{6} = \boxed{\frac{1}{56}}$$

$$P(\text{all males}) = \frac{5}{8} \cdot \frac{4}{7} \cdot \frac{3}{6} = \boxed{\frac{5}{28}}$$

$$P(\text{all are same gender}) = P(\text{FFF or MMM})$$

$$= \frac{1}{56} + \frac{5}{28} = \boxed{\frac{11}{56}}$$

$$P(\text{at least 1 Female}) = 1 - P(\text{MMM}) = 1 - \frac{5}{28}$$

FFF
Some F
MMM

SG 12
SG 13

Exam 1 is on
SG 1-11

Oct 15-11:49 AM

Consider the chart below

x	$P(x)$
1	.1
2	.5
3	.4

1) Verify $\sum P(x) = 1$ ✓

$$.1 + .5 + .4 = 1$$

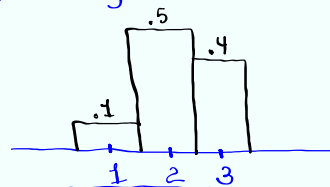
2) Find $P(x \geq 2)$

$$= .5 + .4 = \boxed{.9}$$

$$3) P(x \leq 2) = .5 + .1 = \boxed{.6}$$

4) Draw Prob. dist. histogram

$x \rightarrow$ Midpoint
 $P(x) \rightarrow$ Rel. F.



Clear all lists
 $x \rightarrow L1$, $P(x) \rightarrow L2$

Use 1-Var Stats with

$L1 \div L2$

$$\bar{x} = 2.3$$

S = Blank

Total Prob. $\rightarrow n = 1$

Oct 15-12:00 PM

Consider the chart below

x	$P(x)$
1	.15
2	.25
3	.45
4	.15

1) Verify $\sum P(x) = 1$ ✓

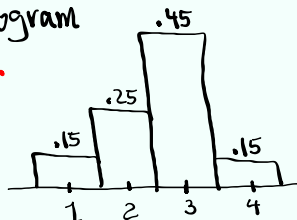
$$.15 + .25 + .45 + .15 = 1$$

2) find $P(2 \leq x \leq 3)$

$$.25 + .45 = .7$$

3) Draw Prob. dist. histogram

$x \rightarrow \text{MP}$, $P(x) \rightarrow \text{Rel. F.}$



clear all lists

$x \rightarrow L1$

$P(x) \rightarrow L2$

use **1-Var Stats** with $L1 \& L2$.

$$\bar{x} = 2.6$$

$S = \text{Blank}$

$$n = 1$$

Oct 15-12:11 PM

x	y
2	6
3	10
3	9
5	15

$x \rightarrow L1$

$y \rightarrow L2$

Use LinReg ($a+bx$) with $L1 \& L2$

$$a = .421$$

$$r^2 = .982 \approx 98\%$$

$$b = 2.947$$

$$r = .991$$

Oct 15-12:19 PM

class MP	class F	use class MP & class F to find	
15	5	Ans with 40	$\bar{x} \approx 30$
25	8		$S \approx 9$
35	12		$S^2 = \frac{12745}{174}$
45	5		$n = 30$

$\bar{x} \approx 31$
 $S \approx 10$
 $S^2 = \frac{8210}{87}$
 $n = 30$

} whole #
 } Reduced frac.

} with

Oct 15-12:23 PM