

Statistics

Lecture 13



Feb 19-8:47 AM

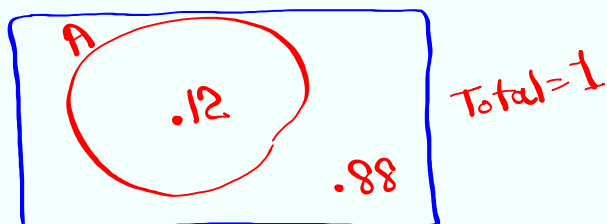
Review

1) Given $P(A) = .12$

a) find $P(\bar{A}) = 1 - P(A) = \boxed{.88}$

b) find odds in favor of event A
 $P(A) : P(\bar{A}) \rightarrow 3 : 22$
 $.12 : .88$

c) Construct Venn Diagram.



Apr 13-10:01 AM

2) $P(A) = .25$, $P(B) = .65$ $P(A \text{ and } B) = .15$

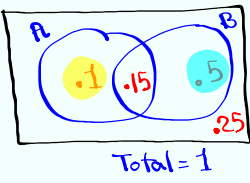
a) $P(\bar{A}) = 1 - .25$
 $= .75$

b) $P(\overline{A \text{ and } B})$
 $= 1 - .15 = .85$

c) $P(A \text{ or } B)$
 $= P(A) + P(B) - P(A \text{ and } B)$
 $= .25 + .65 - .15 = .75$

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

e) Construct Venn diagram
 $.25 - .15 = .1$
 $.65 - .15 = .5$



f) $P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B})$
 De Morgan's Law $= .25$

g) $P(\bar{A} \text{ or } \bar{B}) = P(\overline{A \text{ and } B}) = .85$

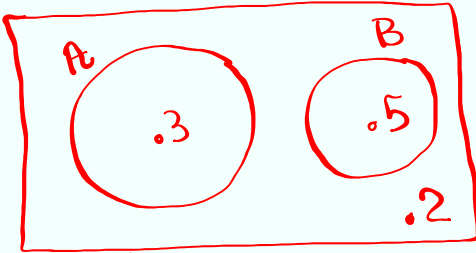
h) $P(\text{A only or B only}) = .1 + .5 = .6$

Apr 13-10:06 AM

3) $P(A) = .3$, $P(B) = .5$, $A \dot{\cap} B$ are M.E.E.

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

b) Construct Venn Diagram



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

Apr 13-10:18 AM

4) odds in favor of event A are 3:47

a) odds against A

$$47:3$$

$$b) P(A) = \frac{3}{3+47} = \frac{3}{50}$$

$$c) P(\bar{A}) = \frac{47}{3+47} = \frac{47}{50}$$

Apr 13-10:23 AM

5) $P(A) = .4$

$P(B) = .5$

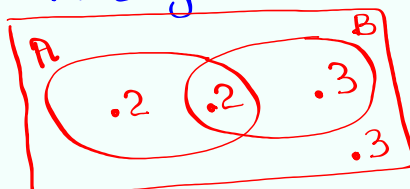
A & B are independent events.

a) $P(\bar{A}) = .6$

b) $P(A \text{ and } B) = P(A) \cdot P(B) = (.4)(.5) = .2$

c) $P(A \text{ or } B) = .4 + .5 - .2 = .7$

d) Construct Venn Diagram



Apr 13-10:27 AM

6) Draw 3 Cards
From a full deck of playing cards

a) P(All Aces with replacement)

$$\frac{4}{52} \cdot \frac{4}{52} \cdot \frac{4}{52} = \boxed{\frac{1}{2197}} = 4.55 \times 10^{-4}$$

b) P(all faces without replacement)

$$\frac{12}{52} \cdot \frac{11}{51} \cdot \frac{10}{50} = \boxed{\frac{11}{1105}} \approx \boxed{.010}$$

Apr 13-10:32 AM

12 Students
8 Females & 4 Males

Select 3 students

F F F P(all Females) = $\frac{8}{12} \cdot \frac{7}{11} \cdot \frac{6}{10} = \boxed{\frac{14}{55}}$



M M M P(all Males) = $\frac{4}{12} \cdot \frac{3}{11} \cdot \frac{2}{10}$

P(at least 1 Female) = $1 - P(\text{No Female}) = \boxed{\frac{1}{55}}$
 $= 1 - P(\text{all males}) = 1 - \frac{1}{55} = \boxed{\frac{54}{55}}$

P(at least 1 Male) = $1 - P(\text{No male})$
 $= 1 - P(\text{All Female}) = 1 - \frac{14}{55} = \boxed{\frac{41}{55}}$

Apr 13-10:38 AM

$$P(A) = .5$$

$$P(B) = .4$$

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

$$1) P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.3}{.5} = \boxed{.6}$$

Given → ↙ ↘

$$2) P(A|B) = \frac{P(A \text{ and } B)}{P(B)} = \frac{.3}{.4} = \boxed{.75}$$

Given → ↙ ↘

Apr 13-10:46 AM

$$P(A) = .75$$

$$P(B) = .1$$

$$P(A|B) = .8$$

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

$$P(A|B) = \frac{P(A \text{ and } B)}{P(B)}$$

$$.8 = \frac{P(A \text{ and } B)}{.1}$$

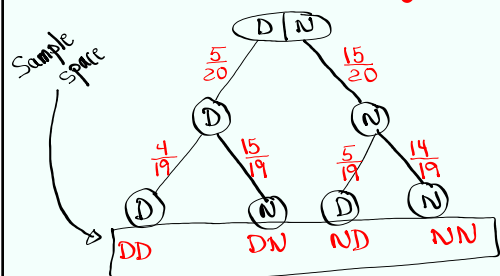
Cross-Multiply

$$P(A \text{ and } B) = (.8)(.1) = \boxed{.08}$$

$$P(B|A) = \frac{P(A \text{ and } B)}{P(A)} = \frac{.08}{.75} = \frac{8}{75} \approx \boxed{.107}$$

Apr 13-10:50 AM

5 dimes, 15 nickels, Take 2 Coins
 No replacement **Tree Diagram**



$$P(DD) = P(20¢) = \frac{5}{20} \cdot \frac{4}{19} = \frac{20}{380}$$

$$P(DN \text{ or } ND) = P(15¢) = 2 \cdot \frac{5}{20} \cdot \frac{15}{19} = \frac{150}{380}$$

$$P(NN) = P(10¢) = \frac{15}{20} \cdot \frac{14}{19} = \frac{210}{380}$$

L1	L2
20	20/380
15	150/380
10	210/380

Stat → CALC
 1:1-Var Stats
 List: L1
 Freq List: L2
 Calculate

$$\bar{x} = 12.5$$

$$S = S_x = \text{Blank}$$

$$n = 1 \leftarrow \text{Total Prob}$$

Apr 13-10:56 AM