Statistics

Lecture 7

Class QZ 3

Given the chart below:

class limits	class F
14 – 22	5
23 – 31	8
32 – 40	7
41 – 49	5

+9 +9 +9

Use class MP and class F to find

1) $\bar{x}$

2) S

Round to whole #

3) S^2

Reduced fraction

Class MP	Class F
18	5
27	8
36	7
45	5

class MP → L1

class F → L2

$\boxed{\text{STAT}}$ $\boxed{\to}$ CALC

$\boxed{\text{1: 1-Var Stats}}$

List: L1

FreqList: L2

$\boxed{\text{Calculate}}$

NO Menu

L1, L2

$\boxed{\text{enter}}$

$\bar{x} = 31.32 \approx 31$

$S = S_x = 9.411 \approx 9$

$S^2 =$

$\boxed{\text{VARS}}$ $\boxed{\text{5: Statistics}}$ $\boxed{3: S_x}$ $\boxed{x^2}$ $\boxed{\text{Enter}}$ 88.56

$\boxed{\text{Math}}$ $\boxed{\text{1: ▶Frac}}$ $\boxed{\text{Enter}}$ $\frac{2214}{25}$

Class QZ 2

Use the chart below

x	y
2	7
3	10
4	12
2	10
5	15

Find

1) $a \approx 4.1$
2) $b \approx 2.1$

} Round to 1-dec.

3) $r^2 \approx 85\%$ } whole %.

4) $r \approx .923$ } 3-dec.

$x \to L1$

$y \to L2$

$\boxed{\text{STAT}}$ $\boxed{\to}$ CALC

$\boxed{\text{8: LinReg}(a+bx)}$

no Menu

L1 , L2 $\boxed{\text{enter}}$

$\boxed{7}$

xlist: L1

Ylist: L2

$\boxed{\text{Clear}}$

$\boxed{\text{Calculate}}$

Intro. to Probabilities

SG 10-13

E → desired outcome (Event)

P(E) → Prob. that E happens.

$$P(E) = \frac{\text{Total \# of all desired outcomes}}{\text{Total \# of all possible outcomes}}$$

24 Students → 10 males & 14 Females

Select 1 person,

$$P(\text{Select a female}) = \frac{14}{24} = \boxed{\frac{7}{12}}$$

A piggy bank has 8 nickels, 10 dimes, and 2 quarters. Randomly take one coin,

$$P(\text{get a dime}) = \frac{10}{20} = \boxed{\frac{1}{2}} = \boxed{.5}$$

$$P(\text{get a nickel}) = \frac{8}{20} = \boxed{\frac{2}{5}} = \boxed{.4}$$

$$P(\text{get a nickel or dime}) = \frac{18}{20} = \boxed{\frac{9}{10}} = \boxed{.9}$$

$$P(\text{get a nickel and dime}) = \frac{0}{20} = \boxed{0}$$

Acceptable Answers:

1) Reduced fraction
2) Rounded to 3-decimal places
3) Scientific Notation

A standard deck of playing cards has 52 cards, 26 are red, 12 are face cards, and 4 aces. Draw one card,

$P(\text{Red}) = \frac{26}{52} = \boxed{\frac{1}{2}}$

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

$\approx \boxed{.231}$

$P(\text{Red or face}) = \frac{26+12-6}{52}$

$= \frac{32}{52}$

$= \boxed{\frac{8}{13}}$

$= \boxed{.615}$

$P(\text{Red and face})$

$= \frac{6}{52} = \boxed{\frac{3}{26}}$

$\bar{E} \rightarrow$ E-bar, Not E

E-Complement

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

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

$P(\text{Rains}) = 20\%$

$P(\overline{\text{Rain}}) = 80\%$

Consider a standard deck of playing cards 52 cards, 4 Aces. Draw 1 card,

$P(\text{Ace}) = \frac{4}{52} = \boxed{\frac{1}{13}}$

4 [÷] 52 [Math] [1:▸Frac] [Enter]

$P(\overline{\text{Ace}}) = 1 - P(\text{Ace}) = 1 - \frac{1}{13} = \boxed{\frac{12}{13}}$

1 [−] 1 [÷] 13 [Math] [1:Frac] [Enter]

Some rules & terminologies:

1) $0 \le P(E) \le 1$

2) Sum of all prob. is always 1.

3) $P(E) = 1 \Longleftrightarrow$ Sure event

4) $P(E) = 0 \Longleftrightarrow$ Impossible event

5) $0 < P(E) \le .05 \Longleftrightarrow$ Rare event

If we randomly Select one person, find the prob. that he/she has a birthday this month.

$\frac{1 \text{ month}}{12 \text{ months}} = \frac{1}{12} = \boxed{.083}$

not a rare event

what about today?

$\frac{1 \text{ day}}{365 \text{ days}} = \frac{1}{365} = \boxed{.003}$

A rare event

I surveyed 100 people. I asked them do you support ICE operation?

	Yes	no	no opinion	Total
Males	8	17	5	30
Females	12	40	18	70
Total	20	57	23	100

If we randomly select one of them,

$P(\text{Female}) = \frac{70}{100} = \boxed{.7}$ $\qquad P(\text{Yes}) = \frac{20}{100} = \boxed{.2}$

$P(\text{Female and Yes}) = \frac{12}{100} = \boxed{.12}$

$P(\text{Female or Yes}) = \frac{70 + 20 - 12}{100} = \frac{78}{100} = \boxed{\frac{39}{50}}$

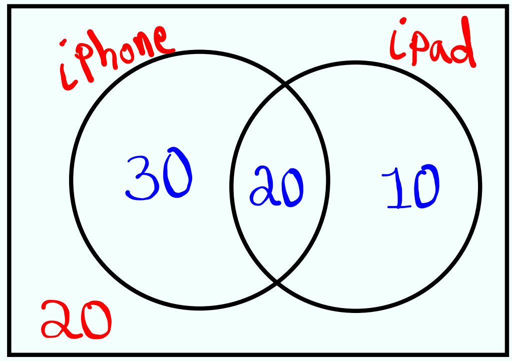
I surveyed 80 people.

50 had iPhones

30 " iPads.

20 had both.

Make Venn Diagram.



Total = 80

Addition Rule:

Keyword : OR

Single Action event

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

$P(A) = .7$, $P(B) = .6$, $P(A \text{ and } B) = .5$

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

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

3) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
$= .7 + .6 - .5 = \boxed{.8}$

Keyword

$P(HB) = .4$

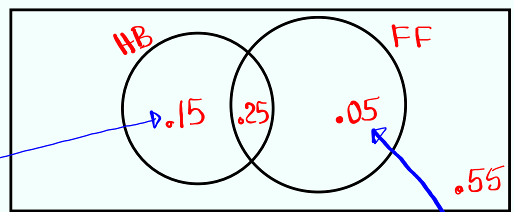
$P(FF) = .3$

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

1) $P(\overline{HB}) = 1 - .4 = \boxed{.6}$ 2) $P(\overline{FF}) = 1 - .3 = \boxed{.7}$

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

$= .4 + .3 - .25 = \boxed{.45}$



P(HB only)

Total = 1

P(FF only)

Mutually Exclusive Events

"Disjointed Events"

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

$P(A) = .8$, $P(B) = .1$, A & B are M.E.E.

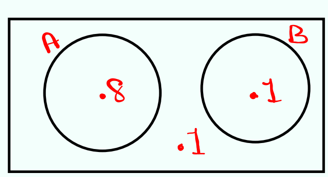
$P(\bar{A}) = \boxed{.2}$ $P(\bar{B}) = \boxed{.9}$

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

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

$= .8 + .1 - 0 = \boxed{.9}$

Draw Venn Diagram



Total = 1

$P(A) = .65$

$P(B) = .25$

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

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

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

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

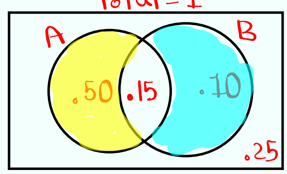
4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$

$= .65 + .25 - .15 = \boxed{.75}$

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

6) Draw Venn Diagram

Total = 1



P(A only OR B only) =

$.5 + .1 = \boxed{.6}$

To Complete SG 11 → You must watch the video Called De Morgan's Law

Odds

odds in favor of event E are

E happens : # $\overline{E}$ happens

Always Reduce

A standard deck of playing cards has 52 cards, 12 are face cards.

odds in favor of drawing a face card.

$\underbrace{\# \text{ Face}} : \# \overline{\text{Face}}$

$12 : 40 \Rightarrow \boxed{3 : 10}$

12 $\boxed{\div}$ 40 $\boxed{\text{Math}}$ $\boxed{\text{1:}\blacktriangleright\text{Frac}}$ $\boxed{\text{Enter}}$ $\frac{3}{10}$

odds against → Reverse the order

odds against face card 10 : 3

25 Students

10 males , 15 females

odds in favor of selecting one male.

$\# \text{Males} : \# \overline{\text{Males}}$

$10 : 15 \rightarrow \boxed{2:3}$

odds against selecting one male $\boxed{3:2}$

Suppose odds in favor of event E are

$a:b$

$P(E) = \frac{a}{a+b}$ $\qquad$ $P(\bar{E}) = \frac{b}{a+b}$

Suppose odds in favor of LA Lakers win the championship this year are $1:29$.

$P(W) = \frac{1}{1+29} = \frac{1}{30} = \boxed{.033}$

$P(\bar{W}) = \frac{29}{1+29} = \frac{29}{30} = \boxed{.967}$

Suppose $P(E)$ is given,

odds in favor of event E are

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

Given $P(E) = .025$

odds in favor of E

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

$$.025 : .975$$

$$\boxed{1 : 39}$$