

Statistics

Lecture 6



Feb 19-8:47 AM

Class QZ 2 (open notes)

Complete the chart below

class limits	class MP	class F
12 - 20	16	6
21 - 29	25	12
30 - 38	34	2

Find

$$1) \bar{x} = 23.2$$

$$2) S = 5.5$$

$$3) S^2 = \frac{2916}{45}$$

Round to 1 dec

Reduced fraction

Class MP → L1

class F → L2

STAT → CALC

1: 1-Var Stats

VARs 5: Statistics 3: Sx

x² Math 1: Srac Enter

Menu

List: L1

Freq List: L2

Calculate

No Menu

1-Var Stats

L1, L2

Enter

Jul 2-6:59 PM

Class QZ 3 (open notes)

Consider the chart below

x	y
4	9
5	10
6	12
6	15
8	15

Find

- 1) $a = 2.841 \approx 3$ } Round to whole #
 2) $b = 1.614 \approx 2$ } Round to whole #
 3) $r^2 = .744 \approx 74\%$ } Round to 3-dec. Places
 4) $r = .863$ } Round to 3-dec. Places

clear all lists

[2nd] [4: clearAll lists] [Enter] [STAT] [→] CALC

x → L1

y → L2

8: LinReg (a+bx)

Menu

No Menu

Xlist: L1

L1, L2

Ylist: L2

Freg list: [clear]

[Enter]

[clear]

[Calculate]

Jul 3-4:19 PM

Using the same chart & rounded answers,

Predict y if $x=4$

1) Assume r is Significant

use

$$y = 3 + 2x$$

$$y = 3 + 2(4) = 11$$

2) Assume r is not Significant

use

 $\bar{y}$

$$\bar{y} = 12.2 \approx 12$$

[VARS] [5: Statistics] [5: $\bar{y}$] [Enter]

Jul 3-4:47 PM

A piggy bank has 4 dimes, 1 Quarter and 15 nickels.

20 Coins

If we randomly select one coin,

$$1) P(\text{Dime}) = \frac{4}{20} = \frac{1}{5} = .2$$

$$2) P(\text{Quarter}) = \frac{1}{20} = .05$$

$$3) P(\text{Dime or Nickel}) = \frac{19}{20} = .95$$

$$4) P(\text{Quarter and nickel}) = \frac{0}{20} = 0$$

Acceptable Answers

1) Reduced Fraction

2) Rounded to 3-decimal places

3) Scientific Notation

Jul 3-4:52 PM

$E \rightarrow$ Desired event or outcome

$P(E) \rightarrow$ Prob. that E happens

Some rules

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

$$2) P(E) = 1 \iff \text{Sure event}$$

$$3) P(E) = 0 \iff \text{Impossible event}$$

$$4) 0 < P(E) \leq .05 \iff \text{Rare event}$$

5) The sum of all prob. is always 1.

Jul 3-5:00 PM

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

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

$$P(\bar{E}) = 1 - P(E) \quad \text{Complement Rule}$$

Suppose $P(E) = .24$

1) write $P(E)$ in reduced fraction

$$.24 \quad \boxed{\text{Math}} \quad \boxed{1 \div \text{frac}} \quad \boxed{\text{enter}} \quad \frac{6}{25}$$

2) find $P(\bar{E})$ in percentage.

$$\begin{aligned} P(\bar{E}) &= 1 - P(E) \\ &= 1 - .24 = .76(100)\% = \boxed{76\%} \end{aligned}$$

Jul 3-5:04 PM

Suppose $P(A) = \frac{7}{40}$

1) write $P(A)$ in decimal

$$7 \div 40 \quad \boxed{\text{enter}} \quad \boxed{.175}$$

2) write $P(A)$ in percentage.

$$.175(100)\% = \boxed{17.5\%}$$

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

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

$$= 1 - \frac{7}{40} = \boxed{\frac{33}{40}}$$

$$1 \boxed{-} 7 \div 40 \quad \boxed{\text{MATH}} \quad \boxed{1 \div \text{frac}} \quad \boxed{\text{enter}}$$

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

$$\frac{1 \text{ Month}}{12 \text{ Months}} = \boxed{\frac{1}{12}}$$

SG 10

Jul 3-5:09 PM

Addition Rule (SG 11)

Keyword OR

Single Action event

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

Given $P(A) = .4$, $P(B) = .8$, $P(A \text{ and } B) = .3$

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

2) $P(\bar{B}) = 1 - P(B) = 1 - .8 = \boxed{.2}$

3) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
 $= .4 + .8 - .3 = \boxed{.9}$

Venn Diagram:

$.4 - .3 = .1$
 $.8 - .3 = .5$

$P(A \text{ only OR } B \text{ only}) = .1 + .5 = \boxed{.6}$ Total = 1 ✓

Jul 3-5:18 PM

$P(HB) = .35$

$P(FF) = .45$

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

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

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

3) $P(HB \text{ OR } FF) = P(HB) + P(FF) - P(HB \text{ and } FF)$
 $\uparrow$ Addition $= .35 + .45 - .25 = \boxed{.55}$

4) Construct Venn Diagram.

$P(HB \text{ only}) = .35 - .25 = .1$
 $P(FF \text{ only}) = .45 - .25 = .2$

$P(HB \text{ or } FF \text{ not both}) = .1 + .2 = \boxed{.3}$ Total = 1 ✓

Jul 3-5:27 PM

Mutually Exclusive Events

Disjoint Events

No overlap

 $A \text{ \& B are M.E.E. } \Leftrightarrow P(A \text{ and } B) = 0$ $P(A) = .15$, $P(B) = .65$, $A \text{ \& B are M.E.E.}$

$$P(\bar{A}) = 1 - .15 = .85$$

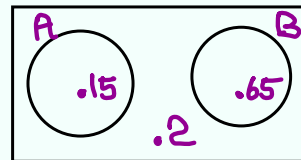
$$P(\bar{B}) = 1 - .65 = .35$$

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

$$P(\overline{A \text{ and } B}) = 1 - 0 = 1$$

Construct Venn Diagram.

Total = 1



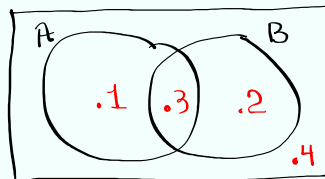
Jul 3-5:35 PM

De Morgan's Law :

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

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

$$P(A) = .4 \text{ , } P(B) = .5 \text{ } P(A \text{ and } B) = .3$$



Total = 1

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

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

$$.4 + .5 - .3 = .6$$

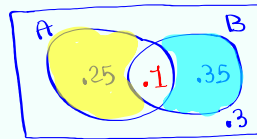
$$P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .6 = .4$$

De Morgan's Law

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

Jul 3-5:45 PM

Complete the Venn Diagram below



$$\text{Total} = 1$$

$$.25 + .35 + .3 = .9$$

$$1) P(A) = .35$$

$$2) P(\bar{A}) = .65$$

$$3) P(B) = .45$$

$$4) P(\bar{B}) = .55$$

$$5) P(A \text{ or } B) = .7$$

$$6) P(\text{A only or B only}) = .25 + .35 = .6$$

$$7) P(\text{A only and B only}) = 0$$

A only & B only are M.E.E.

$$8) P(\bar{A} \text{ and } \bar{B}) = P(\overline{A \text{ or } B}) = 1 - P(A \text{ or } B) = 1 - .7 = .3$$

De Morgan's Law

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

SG 113

Jul 3-6:07 PM

odds vs Probability

odds in favor of event E are

$$a : b$$

of times E happens # of time E happen

Always simplify.

I flipped a coin 20 times.

6 tails & 14 tails

odds in favor of getting tails

6 tails : 14 tails

Divide by 2

3 : 7

odds against 7 : 3

Jul 3-6:20 PM

24 Students , 9 Males, 15 Females

odds in favor of selecting a male student

$$9 \text{ Males} : 15 \text{ Females}$$

Divide by 3

$$3 : 5$$

odds against selecting Male **5:3**

Jul 3-6:25 PM

A standard deck of playing cards has
52 cards , 26 Red, 12 Face , 4 aces.

Select one card

odds in favor of selecting a red card

$$26 \text{ Red} : 26 \text{ Red} \rightarrow 1 : 1$$

odds in favor of selecting ¹²face or ⁴ace.

$$16 \text{ Face or ace} : 36 \text{ Face or Ace}$$

$$4 : 9$$

odds against **9:4**

Jul 3-6:27 PM

How to find $P(E)$ when odds are given.

odds in favor of event E are

$$a : b$$

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

Suppose odds in favor of LA Lakers win the championship next year are 1:19.

$$P(W) = \frac{1}{1+19} = \frac{1}{20}$$

$$P(\bar{W}) = \frac{19}{1+19} = \frac{19}{20}$$

Jul 3-6:32 PM

How to find odds if we know $P(E)$

odds in favor of event E are

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

Always Simplify

Suppose Prob. that LA Dodgers win the World Series this year is .35.

$$P(W) = .35$$

$$P(\bar{W}) = .65$$

odds are $.35 : .65 \Rightarrow \boxed{7 : 13}$

$$.35 \div .65 \quad \text{Math} \quad \frac{1}{\div} \quad \text{Enter}$$

$$\frac{7}{13}$$

Jul 3-6:36 PM

I Flipped a Coin 400 times, it landed tails 275 times.

$$1) P(\text{lands tails}) = \frac{275}{400} = \boxed{\frac{11}{16}}$$

2) odds in favor of landing tails

$$\# \text{ tails} : \# \text{ heads} \rightarrow \boxed{11 : 5}$$

$$275 : 125$$

3) odds against landing tails.

$$5 : 11$$

SG 12 (Pages 1 & 2)

Jul 3-6:41 PM

Complete the Chart below

class limits	class MP	class F	Cum. F	Rel. F	% F
19 - 29	24	8	8	.200	20.0%
30 - 40	35	12	20	.300	30.0%
41 - 51	46	15	35	.375	37.5%
52 - 62	57	5	40	.125	12.5%

Find $\bar{x}$ & s . Round to whole #. (3 Minutes)

class MP $\rightarrow$ L1

class F $\rightarrow$ L2

[STAT] $\rightarrow$ CALC

1:1-VAR Stats

L1 & L2

$$\bar{x} = 39.675 \approx 40$$

$$s = 10.535 \approx 11$$

Find s^2 in reduced fraction (1 minute)

$$s^2 = \frac{5777}{520}$$

Jul 3-6:47 PM

Consider the chart below

x	y
3	10
7	20
2	8
5	30
8	40

"3 Minutes"

Find

$$\sum x = 25$$

$$\sum y = 108$$

$$\sum x^2 = 151$$

$$\sum y^2 = 3064$$

$$n = 5$$

$$\sum xy = 656$$

[STAT] $\rightarrow$ CALC

[2-VAR Stats]

Jul 3-7:01 PM