

Statistics

Lecture 8



Feb 19-8:47 AM

class QZ 5

x	y
3	10
4	15
4	14
5	18
6	21

$n=5$

Find

1) $a = -.308 \approx \boxed{-.3}$ } Round to

2) $b = 3.615 \approx \boxed{3.6}$ } 1-dec.

3) $r^2 = .982 \approx \boxed{98\%}$ whole %

4) $r = \boxed{.991}$ 3-dec.

Regression line

$$y = a + bx$$

$$\boxed{y = -.3 + 3.6x}$$

Coef. of determination

$$r^2 = 98\%$$

98% of y-values were explained by x-values.

Linear Correlation Coef.

$$r = .991$$

It is very close to 1 \rightarrow It is significant

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Predict Y when $x = 4.5$ if we assume

a) r is Significant

Use Regression line

$$y = -.3 + 3.6x = -.3 + 3.6(4.5) \approx \boxed{15.9}$$

$$\approx \boxed{16}$$

b) r is not Significant.

Use \bar{y} $\bar{y} = \frac{\sum y}{n}$

$$= \frac{78}{5} = 15.6 \approx \boxed{16}$$

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Introduction to Probabilities

SG 10

$E \rightarrow$ Desired event or outcome

$P(E) \rightarrow$ Probability that E happens

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

10 Females, 15 males, select 1 person

$$P(\text{Female}) = \frac{10}{25} = \frac{2}{5} \quad 10 \div 25 \quad \boxed{\text{Math}} \quad \boxed{1 \div \text{Frac}} \quad \boxed{\text{Enter}}$$

$$P(\text{Male}) = \frac{15}{25} = \frac{3}{5}$$

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A box has 4 red, 6 white, and 10 blue balls.

Draw 1 ball,

$$1) P(\text{Red}) = \frac{4}{20} = \frac{1}{5} = 0.2 \quad 2) P(\text{Blue}) = \frac{10}{20} = 0.5$$

$$3) P(\text{Red or Blue}) = \frac{14}{20} = \frac{7}{10} \quad 4) P(\text{Red and Blue}) = \frac{0}{20} = 0$$

Acceptable answers

1) Reduced fraction

2) Round to 3-dec. places

3) Scientific notations.

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

Draw 1 card

$$1) P(\text{Red}) = \frac{26}{52} = \frac{1}{2} \quad 2) P(\text{Ace}) = \frac{4}{52} = \frac{1}{13}$$

$$3) P(\text{Red and Ace}) = \frac{2}{52} = \frac{1}{26} \quad 4) P(\text{Red or Ace}) = \frac{26 + 4 - 2}{52} = \frac{28}{52} = \frac{7}{13}$$

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Some rules & Terminologies:

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

2) Sum of all probabilities is always 1.

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

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

5) $0 < P(E) \leq .05 \rightarrow$ Rare event

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

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

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

Complement Rule

Mar 25-2:15 PM

Draw one Card From a full deck of playing cards,

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

$$P(\overline{\text{Face}}) = 1 - P(\text{Face})$$

$$= 1 - \frac{3}{13} = \frac{10}{13}$$

1 [=] 3 [:] 13 [Math] [1:] [Frac] [Enter]

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Given $P(E) = .025$

$$1) P(\bar{E}) = 1 - .025 = \boxed{.975}$$

2) Find $\frac{P(E)}{P(\bar{E})}$ in reduced fraction

$$\frac{.025}{.975} = \boxed{\frac{1}{39}}$$

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If we randomly select one person, find the probability that he/she has a birthday

1) today $\boxed{\frac{1}{365}}$

2) this month $= \boxed{\frac{1}{12}}$

3) This week $\boxed{\frac{1}{52}}$

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I surveyed 100 people.

I asked them if they like rap music.

	Yes	No	Total
Females	25	15	40
Males	45	15	60
Total	70	30	100

If we randomly select one of these people,

$$P(\text{Male}) = \frac{60}{100} = \frac{3}{5} = \boxed{.6}$$

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

$$P(\text{Male and Yes}) = \frac{45}{100} = \boxed{.45}$$

$$P(\text{Male or Yes}) = \frac{85}{100} = \boxed{.85}$$

SG 103 ✓

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Addition Rule:

SG 11

Keyword OR

Single action event

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

both

Ex. $P(A) = .4$ $P(B) = .7$ $P(\text{A and B}) = .2$

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

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

$$P(A \text{ or } B) = P(A) + P(B) - P(\text{A and B}) = .4 + .7 - .2 = \boxed{.9}$$

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

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

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$$P(HB) = .65$$

$$P(FF) = .25$$

$$P(HB \text{ and } FF) = .15$$

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

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

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

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

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Mutually Exclusive Events
no overlap
Disjoint Events

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

$$P(A) = .2$$

$$P(B) = .7$$

A & B are M.E.E.

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

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

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

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

$$= .2 + .7 - 0 = \boxed{.9}$$

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Prob. with Venn Diagram.

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

$.3 - .1 = .2$
 $.6 - .1 = .5$

$P(A \text{ only}) = .2$ $P(B \text{ only}) = .5$

$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
 $= .3 + .6 - .1 = \boxed{.8}$

$P(A \text{ only or } B \text{ only}) = .2 + .5 = \boxed{.7}$

Total = 1

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$P(A) = .3$ $P(B) = .5$

$A \dot{\bar{B}}$ and $\bar{A} B$ are disjoint events.
 No overlap

Draw Venn Diagram

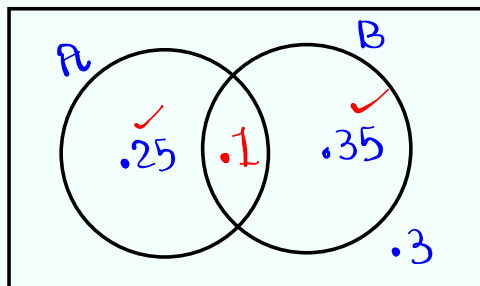
$P(A \text{ and } B) = \boxed{0}$

\checkmark
 Total = 1

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

Mar 25-3:16 PM

Complete the Venn Diagram below



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

2) $P(A \text{ only}) = \boxed{.25}$

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

Total = 1 ✓

4) $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$
 $= .25 + .45 - .1 = \boxed{.6}$

5) $P(A \text{ or } B \text{ but not both}) = .25 + .35 = \boxed{.6}$

Mar 25-3:21 PM

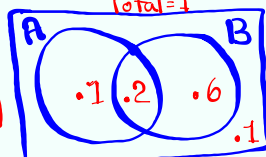
De Morgan's Law:

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

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

$P(A) = .3$ $P(B) = .8$ $P(A \text{ and } B) = .2$

1) Make Venn Diagram



2) $P(A \text{ or } B) = .3 + .8 - .2 = \boxed{.9}$

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

De Morgan's Law

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

SG 11 ✓

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Some Review

	class MP	class F
L1	8	5
	20	8
	32	12
	44	5

find

1) $\bar{x} = 26.8$

2) $S = 11.657$

3) S^2 in reduced fraction.

$$\frac{19704}{145}$$

$n = 30$

Make Sure
to Review

Mar 25-3:36 PM

Use chart below

x	y
7	12
8	15
9	15
10	18
5	10

1) $a = 1.878 \approx 2$

2) $b = 1.554 \approx 2$

3) $r^2 = .941 \approx 94\%$

4) $r = .970$

Regression line
 $y \approx 2 + 2x$

Coef. of determination
94%

94% of y-values are
explained by x-values.

Mar 25-3:40 PM

Predict y when $x=6$ assuming

1) r is significant

$$y \approx 2 + 2x = 2 + 2(6) \approx \boxed{14}$$

2) r is not significant.

$$\bar{y} = 14 \checkmark$$

VARs

5: Statistics

5: \bar{y} | Enter

Start Your Preparation for exam 1

SG 1 – SG 11

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