# Statistics

# Lecture 9

Feb 19-8:47 AM

Class QZ 4

Use the chart below

| x | y |
|---|---|
| 2 | 7 |
| 3 | 10 |
| 6 | 21 |
| 8 | 22 |

Find

1) $a = 2.264 \approx \boxed{2}$

2) $b = 2.684 \approx \boxed{3}$

} Round to whole #

3) $r^2 = .940 \approx \boxed{94\%}$ } whole %

4) $r = \boxed{.970}$ } Round to 3-dec. places

$x \to L1$, $y \to L2$

LinReg(a+bx)

with L1 & L2

STAT → CALC

~~4: LinReg(ax+b)~~

8: LinReg(a+bx)

Oct 1-7:56 AM

Predict $y$ when $x$ is 5.

1) Assume $r$ is Significant

$y \approx 2 + 3x \approx 2 + 3(5) = 17$

2) Assume $r$ is not Significant

use $\bar{y} = 15$

VARS

5: Statistics

5: $\bar{y}$ Enter

Oct 1-10:51 AM

SG 10

Intro. to probabilities:

E → Desired event (outcome)

P(E) → Prob. that E happens

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

Acceptable answers

1) Reduced fraction

2) Rounded to 3-dec. Places

3) Scientific Notation

ex: A class of 20 students, 12 Females, 8 males.

Randomly Select one Student,

$$P(\text{Select a female}) = \frac{12 \text{ Females}}{20 \text{ Students}} = \frac{12}{20} = \frac{3}{5}$$

12 ÷ 20 Math 1: ▶Frac Enter

Math 2: ▶Dec Enter $= .6$

Oct 1-10:54 AM

A standard deck of playing cards has 52 cards

26 are red, 12 face cards, and 4 aces.

draw one card

$P(\text{draw a face card}) = \frac{12 \text{ face}}{52 \text{ cards}} = \frac{3}{13}$

12 ÷ 52 Math 1:▶Frac Enter

$= .231$

Math 2:▶Dec Enter

$P(\text{draw a red face card}) = \frac{6 \text{ red face}}{52 \text{ cards}} = \frac{3}{26} = .115$

$P(\text{draw face and ace}) = \frac{0}{52} = 0$

$P(\text{draw face or ace}) = \frac{16}{52} = .308$

12 4

$\frac{4}{13}$

Oct 1-11:02 AM

E → Desired event

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

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

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

Complement Rule

$P(\text{Rains}) = .15$

$P(\overline{\text{Rain}}) = 1 - P(\text{Rains}) = 1 - .15 = .85$

Suppose $P(A) = \frac{2}{17}$

$P(\bar{A}) = 1 - P(A) = 1 - \frac{2}{17} = \frac{15}{17}$

1 ⊟ 2 ÷ 17 Math 1:▶Frac Enter

$= .882$

Oct 1-11:12 AM

Some rules & Terminologies

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

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

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

4) $0 < P(E) \le .05 \iff$ Rare event

5) Sum of all Probabilities is always 1.

Oct 1-11:19 AM

If we randomly select one person,

P(He/She has a birthday today) = $\frac{1}{365}$

Rare event

$= .003$

$0 < \quad \le .05$

P(He/She has a birthday this month) = $\frac{1}{12}$

Not a rare event

$= .083$

$0 < \quad < .05$

Oct 1-11:23 AM

I Surveyed 100 Voters. I asked them on Prop 50, Yes or No answers.

| | Yes | No | Total |
|---|---|---|---|
| Republican | 5 | 35 | 40 |
| Democrats | 50 | 10 | 60 |
| Total | 55 | 45 | 100 |

If we randomly Select one of them,

1) $P(\text{Republican}) = \frac{40}{100} = .4$

2) $P(\text{Yes}) = \frac{55}{100} = .55$

3) $P(\text{Republican and Yes}) = \frac{5}{100} = .05$

4) $P(\text{Republican or Yes}) = \frac{90}{100} = .9$

5) $P(\text{Republican and Democrat}) = 0$ Impossible event

6) $P(\text{Yes and No}) = 0$

Oct 1-11:29 AM

Select a number from the list below

1 2 3 4 . . . . . 25 26 27 28 29 30

1) $P(\text{Select 4}) = \frac{1}{30} = .033$ Rare event

2) $P(\text{Select below 4}) = \frac{3}{30} = .1$ (1, 2, 3)

3) $P(\text{Select between 4 and 10, inclusive}) = \frac{7}{30} = .233$ (4, 5, 6, 7, 8, 9, 10)

4) $P(\text{Select an odd \#}) = \frac{15}{30} = \frac{1}{2}$ (1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29)

5) $P(\text{Select a multiples of 5}) = \frac{6}{30} = \frac{1}{5} = .2$ (5 10 15 20 25 30)

SG 10 ✓

Oct 1-11:42 AM

## Addition Rule

SG 11

Single Action event

Keyword : OR

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

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

Find

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

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

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

↑ Addition Rule

Oct 1-11:55 AM

$P(\text{Coffee}) = .8$

$P(\text{Donut}) = .3$

$P(\text{Coffee and Donut}) = .2$

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

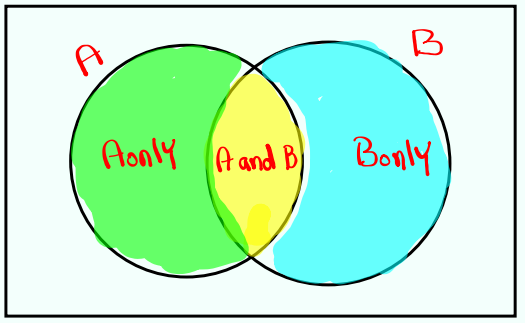
2) $P(\overline{\text{Donut}}) = 1 - .3$
$= \boxed{.7}$

3) $P(\text{Coffee or Donut}) = P(C) + P(D) - P(C \text{ and } D)$
$= .8 + .3 - .2$
$= \boxed{.9}$

↑ Addition Rule

Oct 1-12:01 PM

## Addition Rule with Venn Diagram

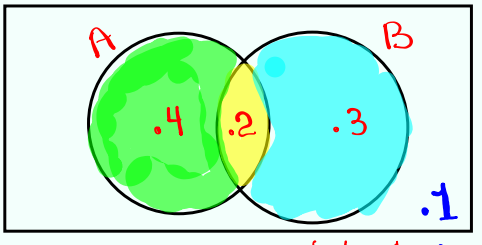



Total = 1

P(A) = .6  P(B) = .5  P(A and B) = .2

.6 − .2 = .4

.5 − .2 = .3




Total = 1 ✓

Oct 1-12:06 PM

P(HB) = .75

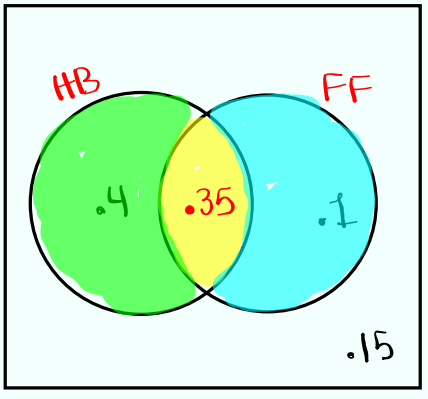
P(FF) = .45

P(HB and FF) = .35

.75 − .35 = .4

.45 − .35 = .1

1 − (.4 + .35 + .1) = .15




Total = 1

P(HB or FF) = P(HB) + P(FF) − P(HB and FF)

addition Rule

= .75 + .45 − .35

= .85

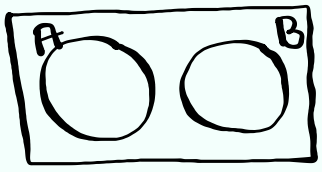
Oct 1-12:13 PM

Mutually Exclusive Events

Disjointed Events

⇒ No overlap

P(A and B) = 0



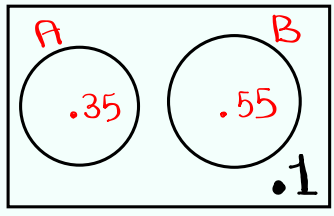

P(A) = .35 P(B) = .55

A & B are M.E.E.

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

2) $P(\bar{B}) = 1 - P(B)$
$= 1 - .55 = .45$

3) Construct Venn Diagram




Total = 1 ✓

Oct 1-12:20 PM