

# Statistics

## Lecture 6



Feb 19-8:47 AM

class QZ 3

Consider the Sample below

25	32	38	40	18
27	35	29	30	20

clear all lists  
 $\boxed{2nd} \boxed{+} \boxed{4: clearAllLists} \boxed{Enter}$

store numbers in a list.

$\boxed{STAT} \boxed{Edit}$	$\boxed{L1}$
$\boxed{1: Edit}$	25
	32
	38
	20

$\boxed{STAT} \boxed{\rightarrow} \boxed{CALC}$   
 $\boxed{1: 1-Var Stats}$   
 List: L1  
 FreqList:  $\boxed{clear}$   
 $\boxed{Calculate}$

$\boxed{VARS} \boxed{5: Statistics} \boxed{3: Sx} \boxed{x^2} \boxed{Enter}$

$\boxed{Math} \boxed{1: \blacktriangleright Frac} \boxed{Enter}$

Find

1)  $\bar{x} = 29.4 \approx \boxed{29}$  } Round to whole #

2)  $S = 7.214 \approx \boxed{7}$  }

3)  $S^2 = \frac{2342}{45}$  } Reduced Fraction

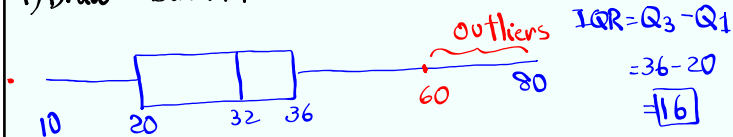
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160 students were randomly taken. 5-number Summary of their ages was

10      20      32      36      80  
 ↑      ↑      ↑      ↑      ↑  
 Min.     $Q_1$     Med.     $Q_3$     Max

1) Draw Box Plot

2) Find IQR



3) Upper Fence       $Q_3 + 1.5(IQR) = 36 + 1.5(16) = 60$

4) Lower Fence       $Q_1 - 1.5(IQR) = 20 - 1.5(16) = -4$

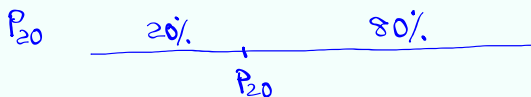
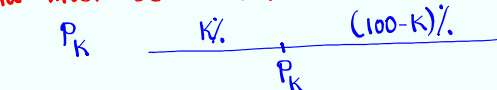
5) Discuss ranges for outliers.

below -4      and      above 60  
 None                      60-80

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### Percentile

Data must be Sorted



How to find  $P_k$   
 if decimal  $\rightarrow$  Round-up  
 $L = \frac{k}{100} \cdot n$        $P_k = \text{Lth element}$   
 if whole  $\rightarrow P_k = \frac{\text{Lth element} + \text{Next element}}{2}$

How to find k: # Below  $P_k$   
 $k = \frac{B}{n} \cdot 100$   
 Round to whole %

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Consider the Stem Plot below

1	89
2	03558
3	0245557
4	2456
5	24

$n = 20$

$P_{30}$

$L = \frac{30}{100} \cdot 20 = 6$

$P_{30} = \frac{\text{6th element} + \text{Next element}}{2}$

$= \frac{25 + 28}{2} = \boxed{26.5}$

30%                      70%

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$P_{30} = 26.5$

$P_{82}$

$L = \frac{82}{100} \cdot 20 = 16.4 \rightarrow L = 17$

$P_{82} = 17\text{th element}$

$= \boxed{45}$

Find  $K$  such that

$P_K = 40$

↗ Below

$K = \frac{B}{n} \cdot 100 = \frac{14}{20} \cdot 100 = \boxed{70}$

70%                      30%

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$P_{70} = 40$

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I randomly selected 24 exams. here are the scores

75	82	55	100
80	90	93	78
72	65	68	85
100	58	70	90
62	69	75	75
90	86	86	78

Clear all lists

Store this data in a list

Sort the list

Make Stem Plot.

View L1

2nd 1 Enter

5	58
6	2589
7	0255588
8	02566
9	00003
10	00

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5   58	<p style="color: red;">Find <math>P_{15}</math></p> $L = \frac{15}{100} \cdot 24 = 3.6 \quad L = 4$ $P_{15} = 4\text{th value}$
6   2589	
7   0255588	
8   02566	
9   0003	
10   00	

Find  $P_{50}$

$$L = \frac{50}{100} \cdot 24 = 12$$

$$P_{50} = \frac{12\text{th value} + \text{Next Value}}{2} = \frac{78 + 78}{2} = 78$$
  

Find  $K$  such that  $P_K = 85$

below

$$K = \frac{B}{n} \cdot 100 = \frac{15}{24} \cdot 100 = 62.5 \approx 63$$

$$\frac{63\%}{\quad} \quad \frac{37\%}{\quad}$$

$$P_{63} = 85$$

$$P_{63} = 85$$

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Below is a portion of a freq. table

class MP	class F
15	6
23	9
31	10
39	5

1) How many classes? 4

2) what is CW? 8

3) Sample Size.

$$n = \sum f = 30$$

class MP  $\rightarrow$  L1, class F  $\rightarrow$  L2

use [1-VAR Stats] with L1 & L2

$$\bar{x} = 26.7\bar{3}$$

$$S = S_x = 8.064$$

$$n = 30$$

Find  $S^2$

[VARS] [5: Statistics]

[3: Sx] [ $\chi^2$ ] [Enter]

$S^2 = 65.030$

[Math] [1: Frac] [Enter]

$$S^2 = \frac{28288}{435}$$

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working with ordered-Pairs

x	y
2	5
3	6
4	5
5	12
2	8

Scatter Plot

clear all lists  
 $x \rightarrow L1, y \rightarrow L2$

**STAT**  $\rightarrow$  **CALC**  
**2: 2-Var Stats**

with menu } No Menu  
xlist: L1 } L1, L2 **enter**  
ylist: L2 } **7**  
FreqList: **clear**  
**Calculate**

$\sum x = 16$        $\sum y = 36$   
 $\sum x^2 = 58$        $\sum y^2 = 294$   
 $n = 5$                $\sum xy = 124$

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Complete the chart below

x	y	$x^2$	$y^2$	$xy$
✓ 1	5	1	25	5
✓ 2	8	4	64	16
✓ 3	10	9	100	30
✓ 4	10	16	100	40

$n = 4$

$\sum x = 10$   
 $\sum x^2 = 30$   
 $\sum y = 33$   
 $\sum y^2 = 289$   
 $\sum xy = 91$

$x \rightarrow L1, y \rightarrow L2$

**STAT**  $\rightarrow$  **CALC**  
**2: 2-Var Stats**      NO Menu  
xlist: L1              L1, L2 **enter**  
ylist: L2              **7**  
FreqList: **clear**  
**Calculate**

Scatter Plot

Regression Line  
 $y = a + bx$   
 $y = 4 + 1.7x$

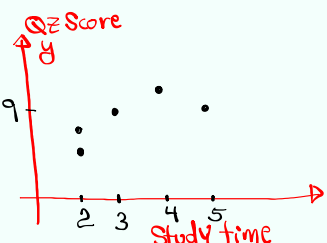
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STAT  $\rightarrow$  CALC  
8: Lin Reg(a+bx)  
 xlist: L1  
 Ylist: L2  
clear enter  
Calculate  
 If  $r$  &  $r^2$  are missing,  
2nd 0  $\downarrow \downarrow \downarrow \dots \downarrow$  Diagnostic On  
Enter  
Enter

No Menu  
 L1, L2  
enter  
 $a = 4$   
 $b = 1.7$   
 $r^2 = .863$   
 $r = .929$

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Study time	QE Score
3	9
4	10
2	8
2	6
5	9



Study time  $\rightarrow x \rightarrow L1$      $\sum x = 16$      $\sum y = 42$   
 QE Score  $\rightarrow y \rightarrow L2$      $\sum x^2 = 58$      $\sum y^2 = 362$   
 $n = 5$      $\sum xy = 140$

STAT  $\rightarrow$  CALC  
2: 2-Var Stats with L1 & L2

STAT  $\rightarrow$  CALC  
8: Lin Reg(a+bx) with L1 & L2.

$a = 5.765$   
 $b = .824$   
 $r^2 = .501$   
 $r = .708$

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$r \rightarrow$  Linear Correlation Coefficient

$$-1 \leq r \leq 1$$

when  $r$  is close to  $\pm 1$ ,  
Linear Correlation is Significant.

when  $r$  is close to 0,  
Linear Correlation is not Significant.

From last example  $r = .708$

It is close to 1

It is Significant.

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$r^2 \rightarrow$  Coefficient of determination

Always round to whole%

It tells us what % of  $y$ -values  
are explained by  $x$ -values.

From last example

$$r^2 = .501 \approx 50\%$$

50% of QZ scores are  
explained by study time.

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x	y
3	10
2	5
3	8
4	11
5	12

$x \rightarrow L1$   
 $y \rightarrow L2$   
 use LinReg( $a+bx$ ) with  
 $L1 \dot{=} L2$  to find  
 $a = 1.615$        $r^2 = .840$   
 $b = 2.231$        $r = .917$

$r^2 \approx 84\%$   
 84% of y-values  
 are explained by x-values

} r is close to 1  
 } Linear Correlation  
 } is significant.

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Class QZ 4  
 use the chart below

class MP	class F
18	4
25	6
32	10
39	5

- 1) Find class width 7
- 2) Find Sample Size  $n = 25$
- 3)  $\bar{x} = 29.48 \approx$  29
- 4)  $S = 6.965 \approx$  7

} Round to  
 } whole #

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