

Statistics

Lecture 4



Feb 19-8:47 AM

Class Quiz 2

Complete the table below

class limits	class M.P	class F	Cum. F
12 - 20	16	5	5
21 - 29	25	8	13
30 - 38	34	7	20
39 - 47	43	5	25

Draw histogram using class M.P & class F. $n=25$

CW = 9

Ogive

Freq. Polygon

Sep 13-2:27 PM

A sample of 160 exams had a mean of 82 and standard dev. of 6.
 Use empirical rule to find

1) 68% Range
 $\bar{x} \pm S = 82 \pm 6$
 $= [76 \text{ to } 88]$

2) Usual Range
 95% Range
 $\bar{x} \pm 2S$
 $= 82 \pm 2(6)$
 $\Rightarrow [70 \text{ to } 94]$

3) 99.7% Range
 $\bar{x} \pm 3S = 82 \pm 3(6) \Rightarrow [64 \text{ to } 100]$

4) What% did above 70?
 2.5% | 95% | 2.5%
 70 | 94
 [97.5%]

5) How many students had unusually high score?
 2.5% (160)
 $= [4]$

Sep 20-11:47 AM

Consider the stem plot below

4 2 3 5 8	1) $n = 36$
5 0 2 4 5 5 7 8	2) Range = $92 - 42 = 50$
6 2 3 5 8 8 8 9 9	3) Midrange = $\frac{92 + 42}{2} = 67$
7 0 3 4 5 5 6 6 8 9	4) Mode = 68
8 2 5 6 8 9 9	5) Estimate $S \approx \frac{\text{Range}}{4} = \frac{50}{4} = 12.5$
9 0 2	

6) P_{30} $L = \frac{30}{100} \cdot 36 = 10.8$ $L = 11$
 $P_{30} = 11\text{th element} = [58]$

30%	70%

$P_{30} = 58$	

7) Median = $P_{50} = \frac{18\text{th} + 19\text{th}}{2} = \frac{69 + 69}{2} = [69]$
 $L = \frac{50}{100} \cdot 36 = 18$

50%	50%

Med. =	
$P_{50} = 69$	

8) Find k such that
 $P_k = [74]$ $k = \frac{B}{n} \cdot 100 = \frac{21}{36} \cdot 100 = 58.3 \approx 58$

58%	42%

74	

Sep 20-11:56 AM

Z-Score

1) Always round to 3-decimal places

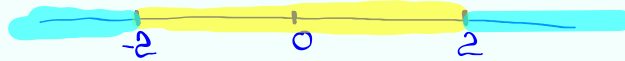
$$2) Z = \frac{x - \bar{x}}{S}$$

3) It tells us how many standard deviations is the data element above or below the mean.

4) It helps us to standardize data elements from different samples and compare.

If $-2 \leq Z \leq 2$, data element is usual

If $Z < -2$ or $Z > 2$, data element is unusual.



Sep 20-12:08 PM

Grace got 90 on exam 1.

$$\bar{x} = 84, S = 8$$

1) What was her Z-Score?

$$Z = \frac{x - \bar{x}}{S} = \frac{90 - 84}{8} = \frac{6}{8} = 0.75$$

2) Is her score usual or unusual? Explain

Since $-2 \leq Z \leq 2$, It is usual.

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Vivian makes \$6600/mo. as a nurse.

$$\bar{x} = 6000, S = 250$$

Connor makes \$5750/mo. as a trainer.

$$\bar{x} = 5000, S = 200$$

$$\text{Vivian } Z = \frac{x - \bar{x}}{S} = \frac{6600 - 6000}{250} = \boxed{2.4}$$

$$\text{Connor } Z = \frac{x - \bar{x}}{S} = \frac{5750 - 5000}{200} = \boxed{3.75}$$

There is a nurse with Z-Score of -1.5. Find his/her Salary.

$$Z = \frac{x - \bar{x}}{S} \quad -1.5 = \frac{x - 6000}{250}$$

$$\text{Cross-multiply } x - 6000 = 250(-1.5)$$

$$x = 6000 - 250(1.5)$$

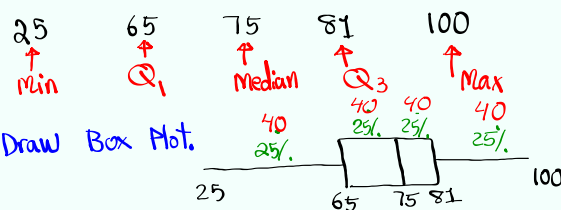
$$\boxed{x = 5625}$$

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I randomly selected 160 exams.

$$160 \div 4 = 40$$

The 5-Number Summary of Scores were

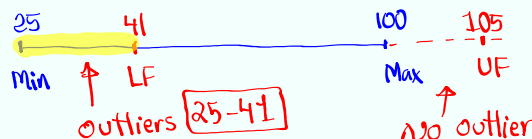


$$2) \text{IQR} = Q_3 - Q_1 = 81 - 65 = \boxed{16}$$

$$3) \text{Upper Fence} = Q_3 + 1.5(\text{IQR}) = 81 + 1.5(16) = \boxed{105}$$

$$4) \text{Lower Fence} = Q_1 - 1.5(\text{IQR}) = 65 - 1.5(16) = \boxed{41}$$

5) Discuss outliers



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TI Instructions:

- 1) To clear the Screen clear
- 2) To clear all lists 2nd + 4:ClearAll lists
Enter
- 3) To reset all lists STAT Edit
5:SetupEditor
Enter
- 4) To quit 2nd MODE

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How to store data elements in a list:

Store the following sample in L1

18	25	32	10	STAT Edit	L1
20	40	35	28	1:Edit	18
19	42	38	15		25
					32
					⋮
					↑ 15

quit & clear the Screen

2nd MODE Clear

View L1:

2nd 1 Enter { 18 25 32 . . . 15 }

→ → →

← ← ←

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How to Sort a list:

STAT Edit 2nd 1 Enter
2:SortA

L1

Let's view L1

2nd 1 Enter

{ 10 15 18 19 → → →

1	0589
2	058
3	258
4	02

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How to find \bar{x} & S :

STAT → CALC 2nd 1
1:1-Var Stats

$\bar{x} = 26.8\bar{3}$
 $S = S_x = 10.599$
 $n = 12$
 Min = 10
 Q₁ = 18.5
 Med. = 26.5
 Q₃ = 36.5
 Max = 42

Menu List: L1
 FreqList: clear
Calculate

No Menu L1 Enter

what about S^2 ?

VARS 5: Statistics
3: S_x x² Enter

$S^2 = 112.\bar{3}$
MATH 1: → Frc Enter
 $S^2 = \frac{337}{3}$

5-Number Summary

Convert to reduced fraction

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Clear all lists

`2nd` `+` `4: Clear All Lists` `Enter`

Store the following in L1

35	28	18	20	30
40	45	32	25	25
42	38	28	19	29
45	37	26	26	20

	L1
	35
	28
↑	18
↑	⋮
↑	20

quit & clear screen

`2nd` `MODE` `clear`

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Sort L1, view L1, Make Stem Plot

`STAT` `Edit` `2nd` `1` `Enter`
`2: SortA(L1)`

`2nd` `H1` `Enter` { 18 19 20

1		89
2		0055689
3		02578
4		0255

→ → →

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Find \bar{x} & S

STAT → **CALC** → **1: 1-Var Stats** → **2nd** **1**

Menu
List: L1
FreqList: **clear**
Calculate

No Menu
L1
Enter

$\bar{x} = 30.4$
 $S = S_x = 8.550$

$n = 20$
Min = 18
 $Q_1 = 25$
Med = 28.5
 $Q_3 = 37.5$
Max = 45

Find S^2 in reduced fraction.

VARS **5: Statistics** **3: Sx**
x² **MATH** **1: Frac** **Enter**

$S^2 = \frac{6944}{95}$

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Working with group data:

class limits	class MP	class F
18 - 25	21.5	2
26 - 33	29.5	10
34 - 41	37.5	8

Find \bar{x} & S

clear All Lists
class MP → L1
class F → L2

L1	L2
21.5	2
29.5	10
37.5	8

STAT → **CALC** → **1: 1-Var Stats**

Menu
List: L1
FreqList: L2
Calculate

No Menu
L1, L2
Enter

$\bar{x} = 31.9$
 $S = S_x = 5.256$
 $n = 20$

Find S^2 in Reduced fraction

VARS **5: Statistics** **3: Sx** **x²** **MATH** **1: Frac**
Enter $S^2 = \frac{2624}{95}$

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Complete the chart below

class BNDRS	class MP	class F	Cum. F
18.5 - 29.5	24	7	7
29.5 - 40.5	35	10	17
40.5 - 51.5	46	23	40
51.5 - 62.5	57	10	50

$\bar{x} = 42.92$
 $S = S_x = 10.433$
 $n = 50$
 Find S^2 in Reduced Fraction

$$S^2 = \frac{133342}{1225}$$

Clear All lists
 class MP \rightarrow L1
 class F \rightarrow L2
 [STAT] \rightarrow
 CALC
 1: 1-Var Stats
 Menu } NO Menu
 List: L1 } L1, L2
 FreqList: L2 } \square
 [Calculate] } [Enter]

Sep 20-1:55 PM

Working with ordered - Pairs

x	y
2	5
3	7
4	7
5	10

(x, y) Scatter Plot

Clear all lists [STAT] \rightarrow CALC
 2: 2-Var Stats
 Menu } NO Menu
 xlist: L1 } L1, L2
 Ylist: L2 } \square
 FreqList: [clear] } [Enter]
 [Calculate]

$\sum x = 14$ $\sum y = 29$
 $\sum x^2 = 54$ $\sum y^2 = 223$
 $n = 4$ $\sum xy = 109$

Sep 20-2:08 PM

STAT \rightarrow CALC
8:LinReg(a+bx)
 $a=2$
 $b=1.5$
 $r^2=.882$
 $r=.939$

Menu
 xlist: L1
 Ylist: L2
clear 3
Calculate

No Menu
 L1, L2
7
Enter

If r & r^2 are missing:
2nd 0 $\downarrow\downarrow\downarrow$ $\dots\downarrow$ \blacktriangleright Diagnostic On Enter Enter

Sep 20-2:16 PM

Class Quiz 3:

Consider the Sample below

58	62	75	83	97
100	70	68	72	88

Find

- 1) $\bar{x} = 77.3 \approx \boxed{77}$ } Round to
- 2) $S = 14.260 \approx \boxed{14}$ } whole #
- 3) $n = \boxed{10}$
- 4) $S^2 = \frac{\boxed{18301}}{\boxed{90}}$ } Reduced Fraction

Sep 20-2:25 PM