

Feb 19-8:47 AM

In - Person Quiz 1
Complete the chart below, then draw ogive.

| class $^{\sqrt{2}}$ BNDRS | class F | ${ }^{\text {Cum. F }}$ |
| :---: | :---: | :---: |
| $15.5-23.5$ | 2 | 2 |
| $23.5-31.5$ | 12 | 14 |
| $31.5-39.5$ | 6 | 20 |


$x \rightarrow$ Data element
$\sum x \rightarrow$ Summation of data elements
$n \rightarrow$ Sample Size
$\bar{x} \rightarrow x$-bar $\rightarrow$ Sample Mean (Average)
$\bar{x}=\frac{\sum x}{n} \quad$ Ex: Consider the Sample below

$$
2,3,5,5,10
$$

1) $n=5$
2) Mode $=5$
3) $\sum x=2+3+5+5+10=25$
4) $\bar{x}=\frac{\sum x}{n}=\frac{25}{5}=5$

Consider the Sample below
$\begin{array}{llllll}1 & 3 & 6 & 10 & 12 & 18\end{array}$

1) $n=6$
2) Mode None
3) $\sum x=1+3+6+10+12+18=50$
4) $\bar{x}=\frac{\sum x}{n}=\frac{50}{6}$

$$
=\frac{25}{3}=8 . \overline{3}
$$

Round to whole

$$
\bar{x} \approx 8
$$

Round to 1 -decimal $\bar{x} \approx 8.3$
$x \rightarrow$ Data element
$\sum x \rightarrow$ Summation of data elements
$\chi^{2} \rightarrow$ Data element to the Second Power
$\sum x^{2} \rightarrow$ Summation of data element squared
$n \rightarrow$ Sample Size
$S^{2} \rightarrow$ Sample Variance

$$
s^{2}=\frac{\sum(x-\bar{x})^{2}}{n-1} \xrightarrow[\text { algebra work }]{\text { with Some }} \quad s^{2}=\frac{n \sum x^{2}-\left(\sum x\right)^{2}}{n(n-1)}
$$

Consider the Sample below

$$
\begin{aligned}
& \begin{array}{l}
1 \begin{array}{l}
1 \\
n=5
\end{array} \quad \begin{array}{r}
3 \\
\text { Range }=5-1=4
\end{array} \\
\text { Midrange }=\frac{5+1}{2}=3 \quad \text { Mode }=3 \\
\sum x=1+3+3+3+5=15
\end{array} \\
& \begin{aligned}
& \sum x^{2}=1^{2}+3^{2}+3^{2}+3^{2}+5^{2}=53 \\
& \bar{x}=\frac{\sum x}{n}=\frac{15}{5}=3 \quad s^{2}=\frac{n \sum x^{2}-\left(\sum x\right)^{2}}{n(n-1)} \\
&=\frac{5 \cdot 53-15^{2}}{5(5-1)}=\frac{40}{20}=2
\end{aligned}
\end{aligned}
$$

Complete the chart below

| $x$ | $x^{2}$ |
| :---: | :---: |
| 2 | 4 |
| 3 | 9 |
| 5 | 25 |
| 5 | 25 |
| 5 | 25 |
| 10 | 100 |

5) $\sum x=30$
6) $\bar{x}=\frac{\sum x}{n}=\frac{30}{6}=5$
using TI
228 우 30 MATH $1:$ Fac Enter $\frac{38}{5}$
$\chi \rightarrow$ Data element
$\bar{\chi} \rightarrow$ Sample Mean
$\sum x \rightarrow$ Summation of $x$
$\sum x^{2} \rightarrow$ Summation of $x^{2}$
$n \rightarrow$ Sample Size

$$
\bar{x}=\frac{\sum x}{n}
$$

$S^{2} \rightarrow$ Sample Variance

$$
S^{2}=\frac{\sum(x-\bar{x})^{2}}{n-1} \text { OR }
$$

$$
S^{2}=\frac{n \sum x^{2}-\left(\sum x\right)^{2}}{n(n-1)}
$$

$$
\text { Standard deviation }=\sqrt{\text { variance }}
$$

Given $n=5, \sum x=20, \sum x^{2}=88$

1) $\bar{x}=\frac{\sum x}{n}=\frac{20}{5}=4$
2) $S^{2}=\frac{n \sum x^{2}-(\Sigma x)^{2}}{n(n-1)}=\frac{5 \cdot 88-20^{2}}{5(5-1)}=\frac{40}{20}=2$
3) $S=\sqrt{S^{2}}=\sqrt{2} \approx 1.414$
using TI
[and [x] a Enter

Mar 15-8:51 AM

Consider the Sample below
$\begin{array}{lllll}1 & 3 & 6 & 8 & 1) \\ n & =8\end{array}$
$\begin{array}{llll}10 & 12 & 15 & 20\end{array}$
2) Range $=20-1=19$
3) midrange $=\frac{20+1}{2}=10.5$
4) Mode $=$ None
5) $\sum x=75$
6) $\sum x^{2}=979$
7) $\bar{x}=\frac{\sum x}{n}=\frac{75}{8}=9.375$
8) $S^{2}=\frac{n \sum x^{2}-\left(\sum x\right)^{2}}{n(n-1)^{2}}$
whole $\rightarrow 9$
1 -DeC. $\rightarrow 9.4$
$2-$ DeC. $\rightarrow 9.38$

$$
\begin{aligned}
& =\frac{8.979-75^{2}}{8(8-1)}=\frac{2207}{56} \\
& =39.411 \\
& \text { MATH 1: WraC Enter }
\end{aligned}
$$

9) $S=\sqrt{S^{2}}=\sqrt{\frac{2207}{56}}=6.278$

$$
\frac{2207}{56}
$$

from Algebra $\sqrt{ }$ is the Same as power. 5 $2207 \div 56$ Enter
$\square .5$ Enter

Given $\quad n=5, \quad \sum x=15, \quad \sum x^{2}=45$
find

1) $\bar{x}=\frac{\sum x}{n}=\frac{15}{5}=3$
2) $S^{2}=\frac{n \Sigma x^{2}-(\Sigma x)^{2}}{n(n-1)}=\frac{5 \cdot 45-15^{2}}{5(5-1)}=\frac{0}{20}=0$
3) $S=\sqrt{S^{2}}=\sqrt{0}=0$

Zero.

How to estimate a Sample standard div.

$$
S \approx \frac{\text { Range }}{4}
$$

"The range rule-of-Thumb"
Suppose $M_{\text {in }}=20, M_{\text {ax }}=100 \quad$ Find

1) Range $=$ Max - Min

$$
\begin{equation*}
=100-20=\frac{80}{2}= \tag{aligned}
\end{equation*}
$$

3) Estimate $S \quad S \approx \frac{\text { Range }}{4}=\frac{80}{4}=20$

Whenever Mean $=$ Mode $=$ Median , is the value in the middle on a sorted data.
data distribution will be symmetric and has a bell-shape graph


Mar 15-9:31 AM

Empirical Rule
$68 \%$ Range $\Rightarrow \bar{x} \pm S$
$95 \%$ Range $\Rightarrow \bar{\chi} \pm 2 S$ Usual Range
$99.7 \%$ Range $\Rightarrow \bar{x} \pm 3 S$

I randomly selected 80 exams, dist. of Scores were symmetric with mean of 82 and standard deviation of 6 .
$68 \%$ Range $\Rightarrow \bar{x} \pm S=82 \pm 6 \Rightarrow 76$ to 88 about $68 \%$ of scores are within $P$
$95 \%$ Range $\Rightarrow \bar{x} \pm 2 S=82 \pm 2(6)=82 \pm 12$
usual Range
About $95 \%$ of Scores fall within


5\% of scores will be unusual.

$$
5 \% \text { of } 80=.05(80)=4
$$




I randomly selected 200 exams. The 5 -Number Summary of Scores were $\longrightarrow 200 \div 4=50$

| 20 | 50 | 15 | 80 | 100 |
| :--- | :--- | :--- | :--- | :--- |
| $\min$ | $Q_{1}$ | $\operatorname{med}$ | $Q_{3}$ | $\max$ |


$I Q R=Q_{3}-Q_{1}=80-50=30$
upper fence $=Q_{3}+1.5(I Q R)=80+1.5(30)=125$
Lower fence $=Q_{1}-1.5(I Q R)=50-1.5(30)=5$
Discuss Outliers $\rightarrow$ Nothing below 5 Nothing above 125 $\rightarrow$ None

$$
\begin{aligned}
& \text { I randomly selected } 80 \text { nurses. Here are the } \\
& 5 \text { - Number Summary of their ages } \rightarrow 80 \div 4= \\
& 24 \quad 32 \quad 38 \quad 40 \quad 75 \\
& \min Q_{1} \operatorname{med} Q_{3} \max \\
& \text { Box Plot } \\
& I Q R=Q_{3}-Q_{1}=40-32=8 \\
& \text { upper fence }=Q_{3}+1.5(I Q R)=40+1.5(8)=52 \\
& \text { Lower Since }=Q_{1}-1.5(I Q R)=32-1.5(8)=20
\end{aligned}
$$

Mar 15-10:07 AM
$Z$-Score
$Z=\frac{\chi-\bar{\chi}}{S}$ Always round to $\begin{aligned} & \text { 3-decimal } \\ & \text { Places. }\end{aligned}$
$Z$-Score indicates how many standard
deviations is the data element above or below the mean.
It is a method to standardize data elements and compare data elements from different samples.
If $-2 \leq z \leq 2 \Rightarrow$ usual data element If $z<-2$ or $z>2 \Rightarrow$ unusual data element usual
unusual -2
2

Lisa got 92 on exam 1.

$$
\begin{aligned}
& \bar{x}=85, S=5 \\
& Z=\frac{x-\bar{x}}{S}=\frac{92-85}{5}=1.4 \quad \text { Usual Score }
\end{aligned}
$$

She got 85 on exam 2 .

$$
\begin{aligned}
& \bar{x}=72, S=4 \\
& Z=\frac{x-\bar{x}}{S}=\frac{85-72}{4}=3.25 \quad \text { unusual } \\
& \text { Score }
\end{aligned}
$$

Sample below is for ages of 25 randomly Selected students



Mar 15-10:38 AM

Doing Reverse:
find $K$ Such that $P_{K}=45$

$$
\begin{align*}
K & =\frac{B}{n} \cdot 100 \quad \text { Round to }  \tag{45}\\
& =\frac{19}{25} \cdot 100=76 \quad \begin{array}{c}
\text { whole } \% \\
\hline 6 \%
\end{array}
\end{align*}
$$

find $P_{55}=14$ th element $=35$

$$
L=\frac{55}{100} \cdot 25=13.75 \rightarrow L=14
$$

Find $P_{80}=\frac{\text { roth element }+ \text { Nextone }}{2}=\frac{45+48}{2}$

$$
L=\frac{80}{100} \cdot 25=20 \quad=46.5
$$

In -Person QE 2
use Sample below

1) Mode $=3$ \& 5

1335
$\begin{array}{llll}5 & 8 & 9 & 10\end{array}$
2) $\sum x=44$
3) $\sum x^{2}=314$

