3-29

STATISTICAL VARIABLES

3 MEASURES OF CENTRAL TENDENCY

MEAN
MEDIAN } (MIDDLE)
MODE

2 MEASURES OF SPREAD

STANDARD DEVIATION (STD. DEV.)
VARIANCE (VAR.)

1 MEASURE OF SYMMETRY

SKEWNESS (TAIL)

MEASURES OF CENTRAL TENDENCY

MEAN SAMPLE VARIABLE x (THE DATA)
MEAN $\bar{x}$

POPULATION PARAMETER
MEAN μ 'MU'

Σ 'SIGMA' "THE SUM OF..."
n NUMBER OF DATA ITEMS

FORMULA FOR A SAMPLE MEAN

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

EXAMPLE: 1, 1, 2, 3, 4, 4, 5, 5, 5 $n = 9$

(1)

$$\bar{x} = \frac{30}{9} = 3.3\overline{3}$$

EXAMPLE: 1.1, 1.2, 1.3, 1.8, 2.0, 2.6, 3.1, 4.6, 4.8, 5.1 $n = 10$

(2)

$$\bar{x} = \frac{27.6}{10} = 2.76$$

ENTERING THE DATA ON THE TI-30Xa CALCULATOR

ENTER EACH VALUE, THEN HIT [Σ+] AFTER EACH

TO EXTRACT THE MEAN, [2nd] [$\bar{x}$]

WHAT IF ONE OF MY DATA VALUES IS VERY DIFFERENT FROM THE OTHERS?

(3) 1, 1, 2, 4, 5, 1000 $\bar{x} = 169$

MEDIAN

IGNORES EXTREME DATA VALUE

- ORDER THE DATA
- CHECK n: IF n IS ODD, THE MEDIAN IS THE MIDDLE OF THE ORDERED LIST

IF n IS EVEN, THE MEDIAN IS THE AVERAGE OF THE TWO MIDDLE NUMBERS

OUR EXAMPLE: (3) MEDIAN $= \frac{2+4}{2} =$ [3]

OUR OTHER EXAMPLES:

(1) MEDIAN = [4]

(2) MEDIAN $= \frac{2.0+2.6}{2} =$ [2.3]

MODE

INDICATES THE MOST POPULATED CLASS OF THE DATA

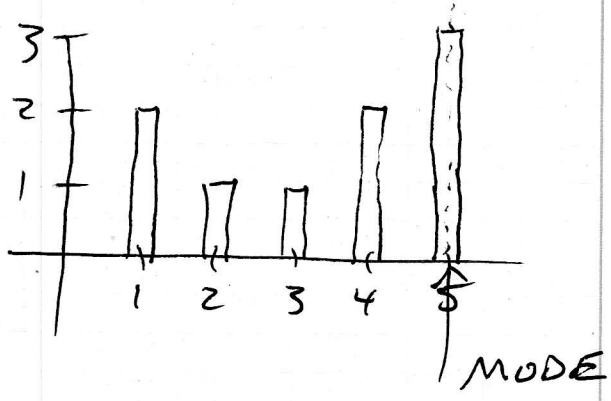
- FOR DISCRETE DATA THE MODE IS THE NUMBER THAT APPEARS THE MOST TIMES

- FOR CONTINUOUS DATA, THE MODE IS THE MIDDLE OF THE RANGE THAT HAS THE MOST DATA IN IT.

THE MODE IS THE MIDDLE OF THE TALLEST BAR IN THE GRAPH.

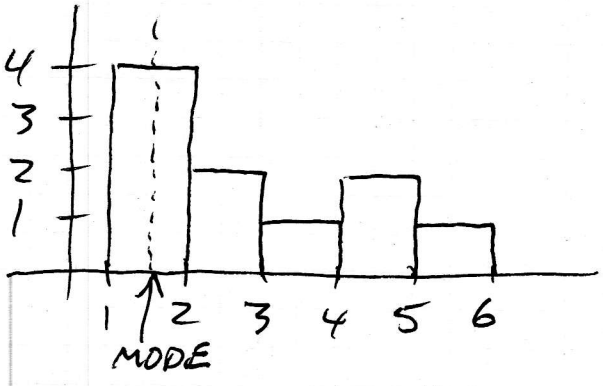
① 1, 1, 2, 3, 4, 4, 5, 5, 5

MODE = 5



②

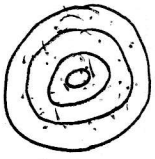
CLASS	FREQ
1-2	4
2-3	2
3-4	1
4-5	2
5-6	1



MODE = 1.5 (BETWEEN 1 AND 2)

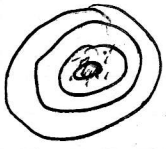
ACCURACY VS. PRECISION

TARGETS



GOOD ACCURACY
POOR PRECISION

BAD ACCURACY
GOOD PRECISION



GOOD ACCURACY
GOOD PRECISION

BIAS IN A SAMPLE
- WRONG SAMPLE
- SMALL SAMPLE SIZE

MEASURES OF SPREAD

- VARIANCE
- ~~±~~ STANDARD DEVIATION

SAMPLE: } s OR σ FOR STD. DEV.
AND OR
POPULATION } ↖ 'SIGMA'

s^2 OR σ^2 FOR VARIANCE

OUR CALCULATOR:

	SAMPLE STD. DEV.	POPULATION
USE	$\boxed{\sigma_{x_{n-1}}}$	(σ_{x_n})

$VAR = (STD.\_DEV.)^2$ ← USING STATS MODE IN CALCULATOR

AND $STD.\ DEV. = \sqrt{(VAR.)}$ ← TABULAR METHOD (WORKS FOR ALL CALCULATORS)

$$\sigma_{x_{n-1}} = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$