VII. Cont.

iv. Range

NFL salary range: $600k, 2 million, 3 million, 200 million, 375 million, 300 million.

Range: $375,000,000 - 800,000$

$= \boxed{374,2000,000}$ dollars

SAT's subject score range: 600 because 200 is the lowest and 800 is the highest.

v. Midrange ← "midlife: 43 year old"

It is the half way of range.

That is,

$$\boxed{\text{midrange} = \frac{\text{Min value} + \text{Max Value}}{2}}$$

"$43 = \frac{0 + 86}{2}$" (0 = born, 86 = die)

eg Midrange of my life is 43, because $\frac{0+86}{2} = 43$.

eg. SAT's midrange:

J. SAT's midrange :

$$\frac{200+800}{2}$$

$$= \boxed{500}$$

eg The speed for traffic at 4:30 am on Freeway-101, the slowest traffic is 60 mph, and fastest is 90 mph.

Then, $\text{midrange} = \frac{60+90}{2}$

$$= \boxed{75} \text{ mph}$$

eg Exam 1's lowest score is 50%, and highest is 100%

Then, $\text{midrange} = \frac{50\%+100\%}{2}$

$$= \boxed{75\%}$$

vi Standard Deviation

The standard deviation is the measure of data's speed from the mean.

Notation: s for the sample data (up to $N-1$)

σ for the population data (N)

Sigma Σ

σ

Formula:

$$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{N-1}}, \qquad \sigma = \sqrt{\frac{\Sigma(x-\mu)^2}{N}}$$

Note: $N-1$ is a sample. Also, if the problem that you see does not specify the data values are a population, we assume they are a sample.

Eg1. Find the standard deviation of these numbers: 22, 22, 26, 24. (x_1 x_2 x_3 x_4)

Sol:

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

$$\bar{x} = \frac{22+22+26+24}{4} = \frac{94}{4} = 23.5$$

$$s = \sqrt{\frac{(22-23.5)^2+(22-23.5)^2+(26-23.5)^2+(24-23.5)^2}{4-1}}$$

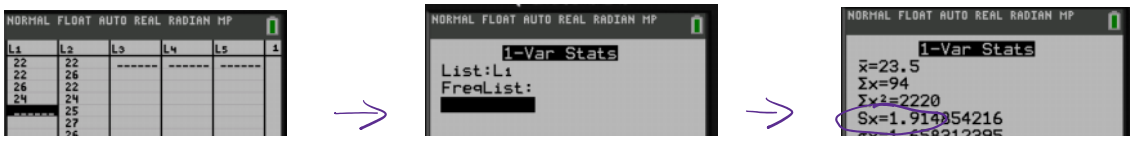
$$= \sqrt{\frac{(-1.5)^2+(-1.5)^2+(2.5)^2+(0.5)^2}{3}}$$

$$= \sqrt{\frac{2.25+2.25+6.25+0.25}{3}}$$

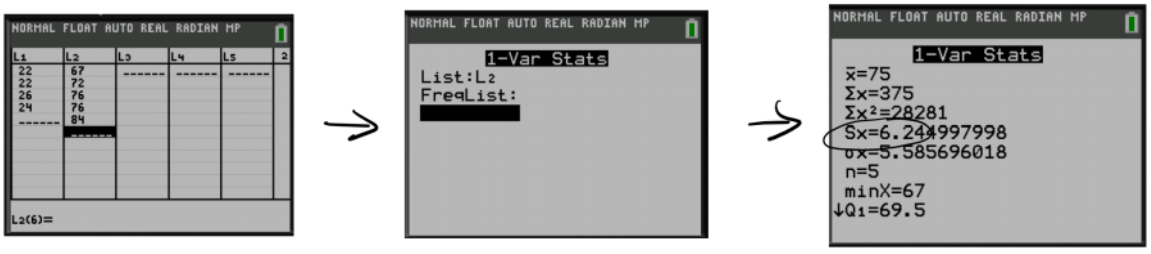
$$= \sqrt{\frac{11}{3}}$$

$$\approx \boxed{1.915}$$

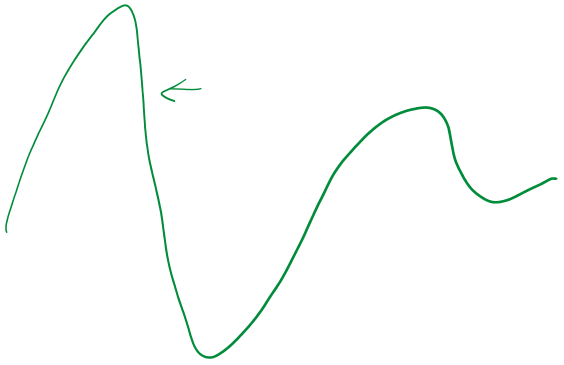
(II-84):



Eg2. Compute the standard deviation of 67, 72, 76, 76, and 84 inches.
Sol:



Vii. Variance ← height "rise"



Variance is s^2 or σ^2.

Notation: V for a sample data.

V for a population data.

Eg Find the variance of these numbers: 22, 22, 26, 24.

S: From above, $s = 1.915$

$V = s^2$

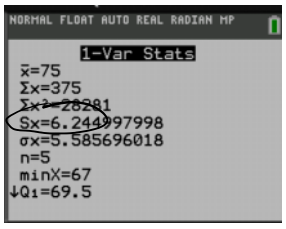
$= (1.915)^2$

$= \boxed{3.667}$ ← $\frac{11}{3}$

$\sqrt{\frac{11}{3}}$

Eg Find the variance of these numbers: 67, 72, 76, 76, and 84 .

S:



$s \approx 6.245$

$V = s^2 = (6.245)^2 = \boxed{39}$

VIII. Probability ← chance that may happen

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

i. Defn

The probability is the calculation of event occur over the overall procedure of an experiment.

- Simple event is an outcome of a procedure (your outcome)
- Sample space is consisting of all possible simple events.

Notation: $P_r(x)$ ← $P(x)$ is more popular

$$P_r(x) = \frac{\text{num. of times occur}}{\text{total num. of times}}$$

$$0 \le P_r(x) \le 1$$

$$0 \leq P_r(x) \leq 1$$

0% 100%

rule

Prob = 1

⋮

0.95 ← cutoff for very high

very → unusual → extreme

⋮

⋮

0.05 ← cutoff for very low

⋮

0

* Remember: 0.95 is the cutoff for very high.
0.05 is the cutoff for very low.

Eg When two children are born, find the probability of getting the children of the same gender.

S: Sample space = {bb, bg, gb, gg}

$$P_r(\text{same gender}) = \frac{\text{'bb, gg'}}{4}$$

$$= \frac{2}{4} = \frac{1}{2}$$

$= \boxed{\frac{1}{2}}$ or $\boxed{0.5}$

2^3

Eg When three children are born, find the probability of getting the children of the same gender.

S: Sample space $= \{bbb, bbg, bgb, bgg, gbb, gbg, ggb, ggg\}$

$Pr(\text{same gender}) = \frac{\text{'bbb, ggg'}}{8}$

$= \frac{2}{8}$

$= \boxed{\frac{1}{4}}$ or $\boxed{0.25}$