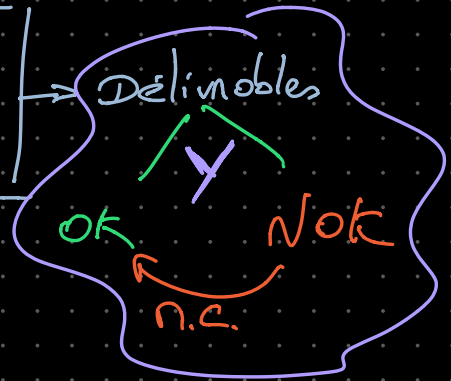
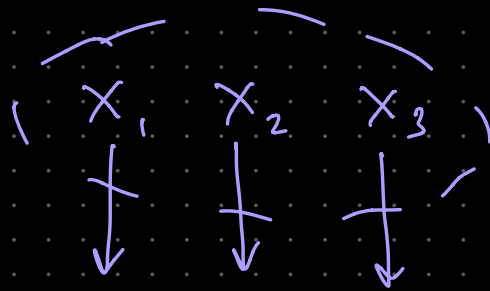
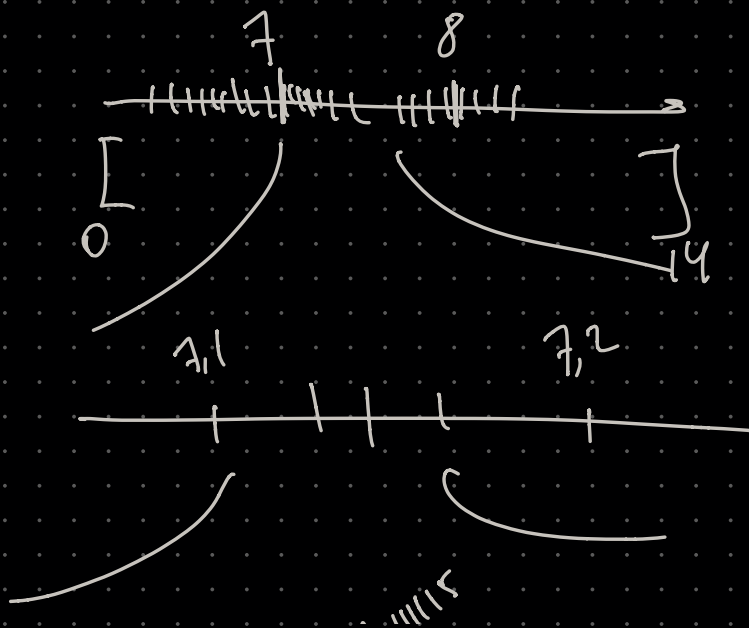


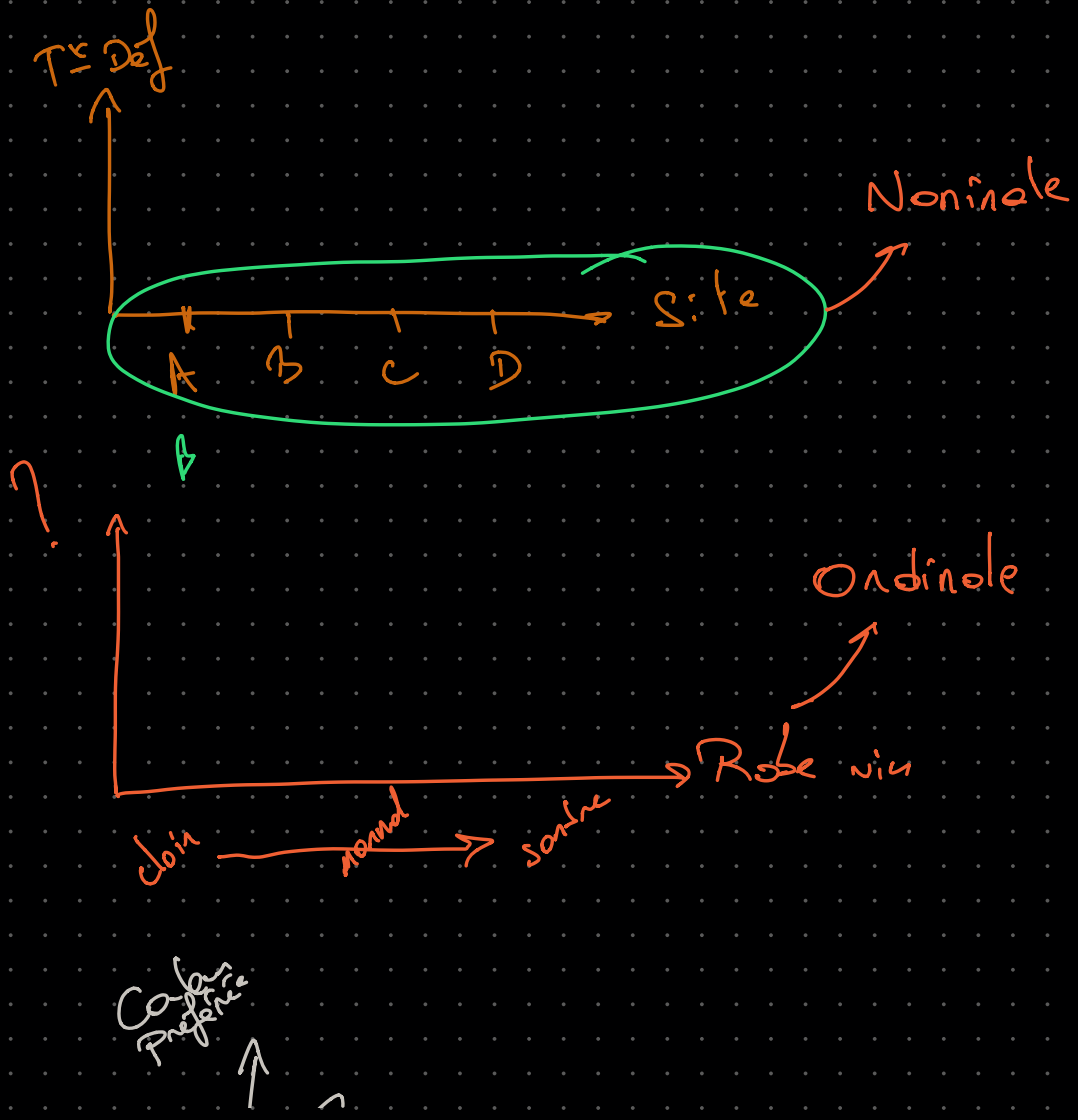
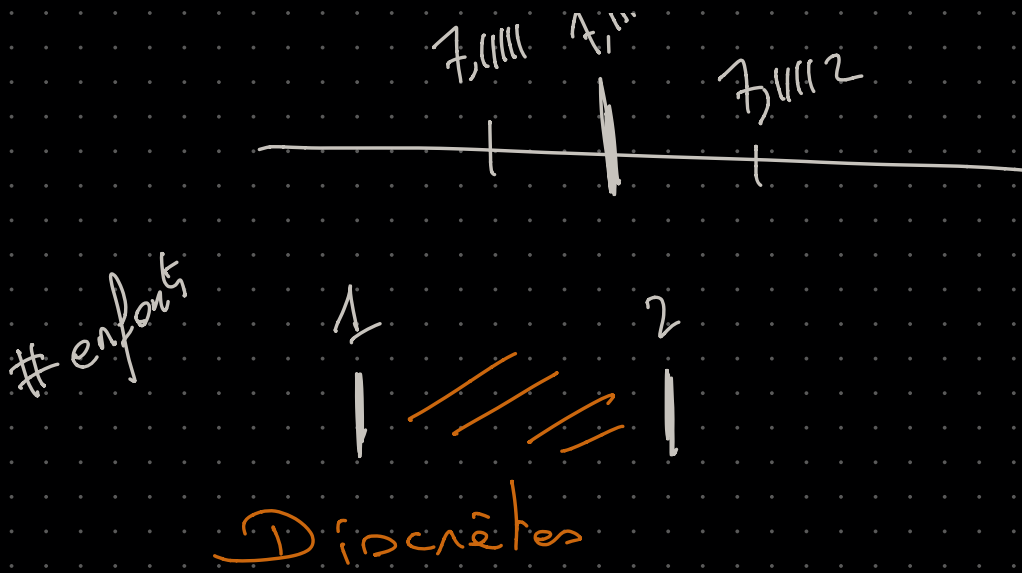
ici :

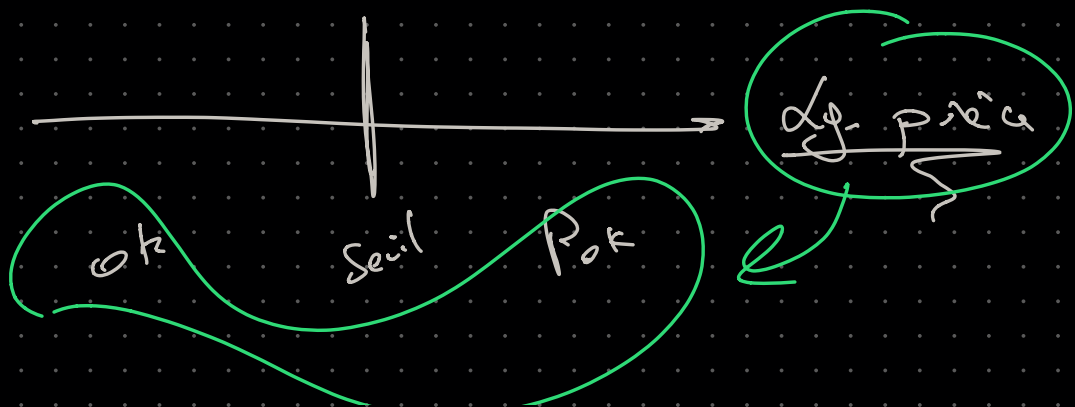
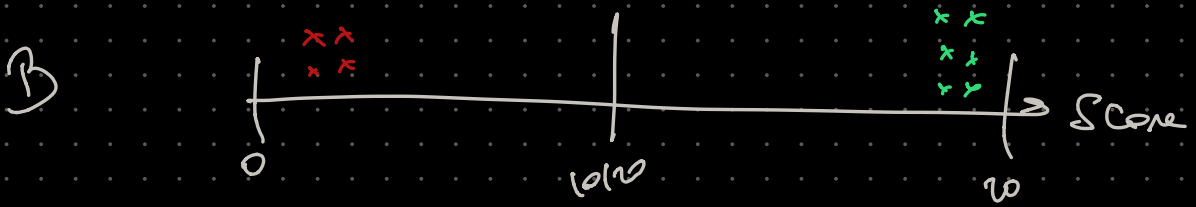
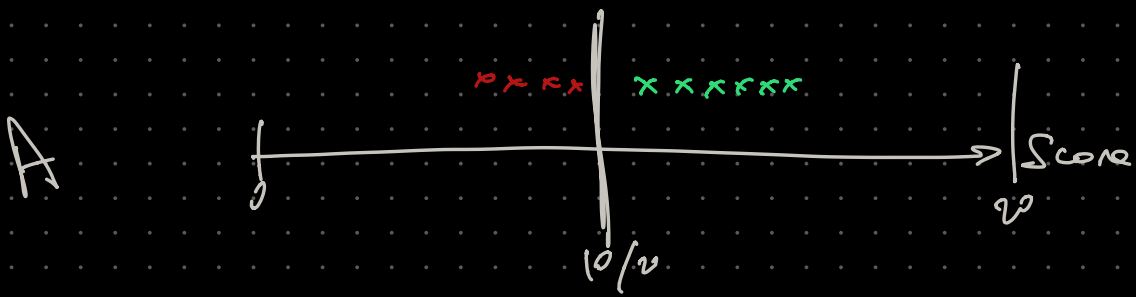
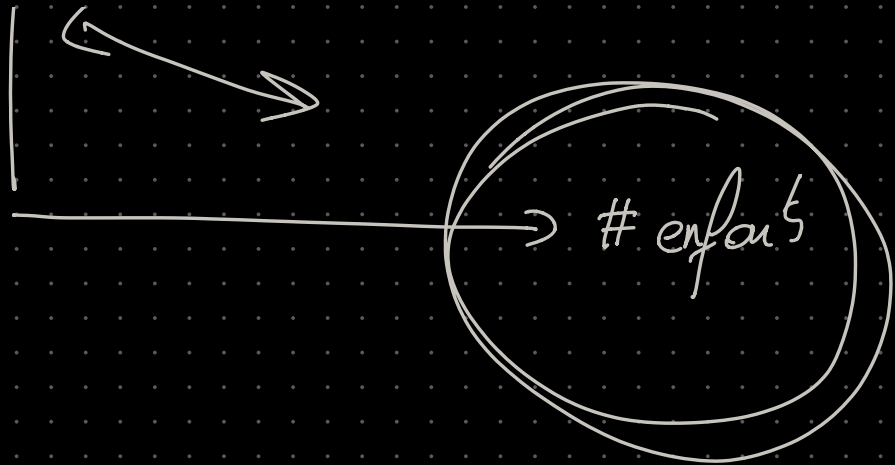


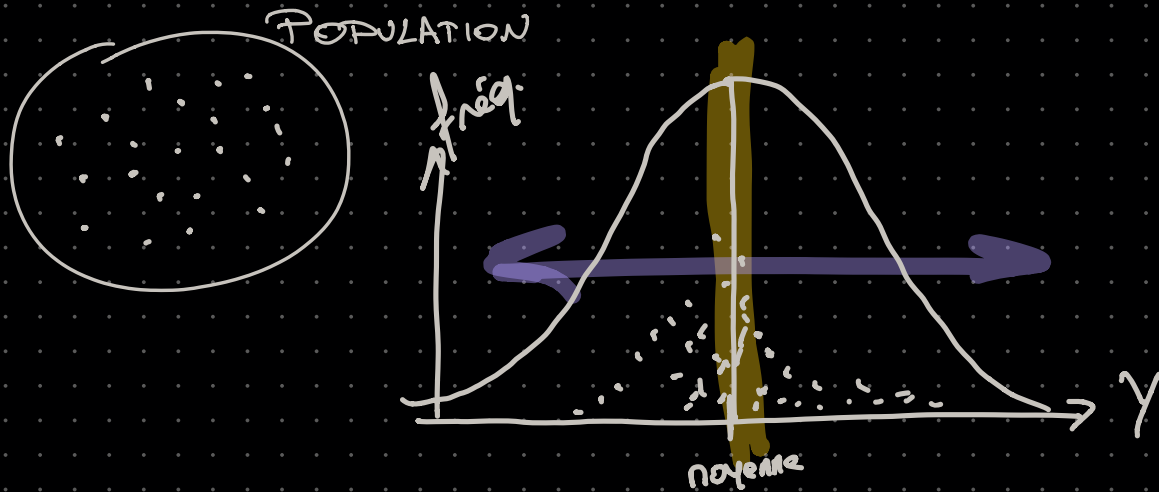
$$Y = f(x_i)$$

Taille









Distribution des valeurs de la variable Y

↳ caractérisée par

Tendance Centrale

et

Dispersion

Indicateurs de TC

8 11 9 12 10
100

$$\text{Moyenne} = \frac{\sum x_i}{n} = \bar{x}$$

$$\frac{8+11+9+12+10}{5} = 10$$

$$8+11+9+12+100 = 28$$

Sensible aux valeurs extrêmes !

Médiane

8 9 10 11 12

50^e obs.
↑
observations

50^e obs.
observations

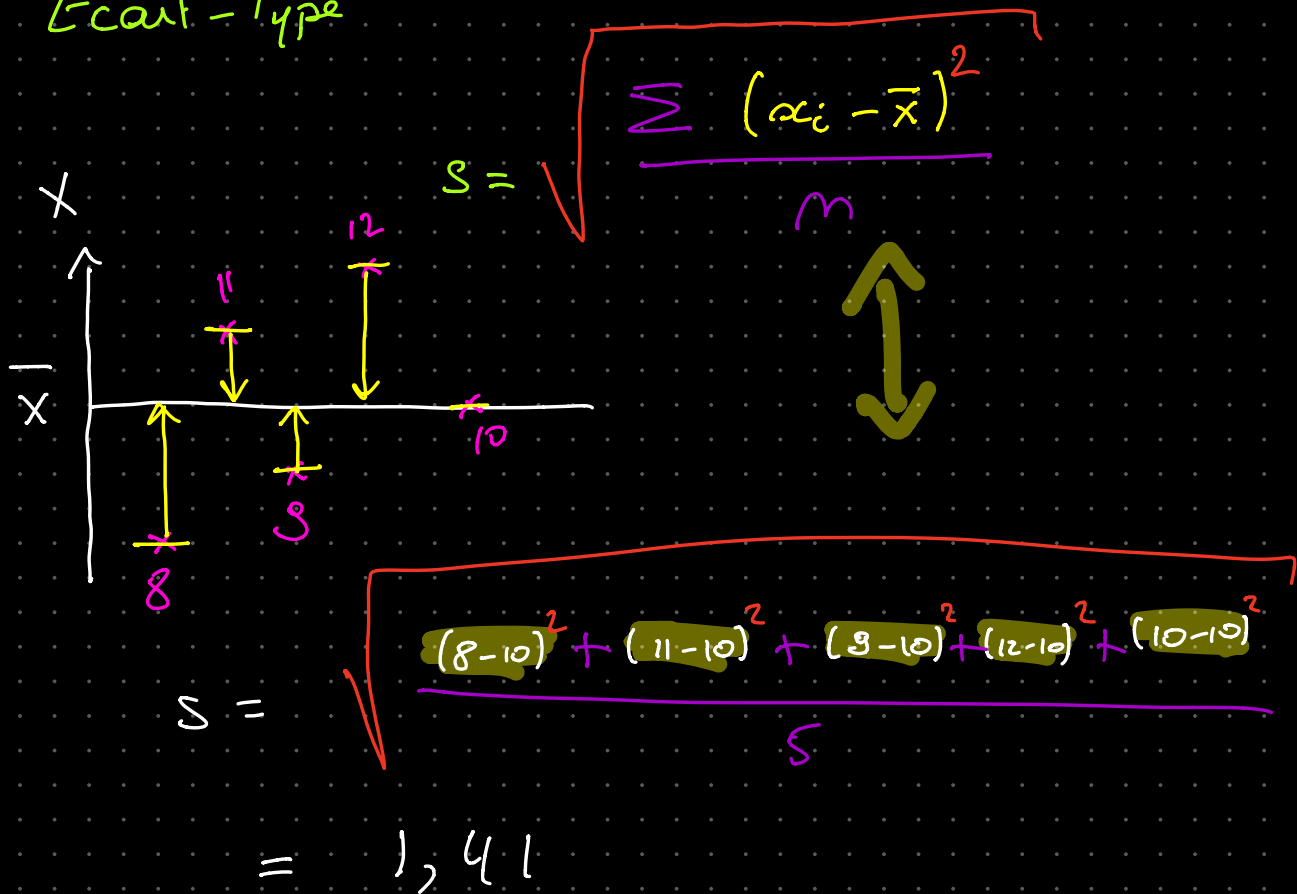
8 9 11 12 (100)

Mode

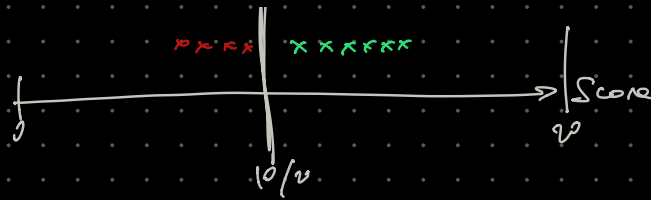
10h45

Indicateurs de Dispersion

Ecart-Type

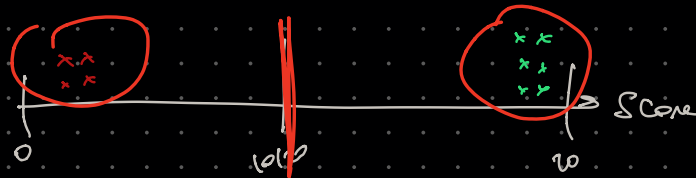


A



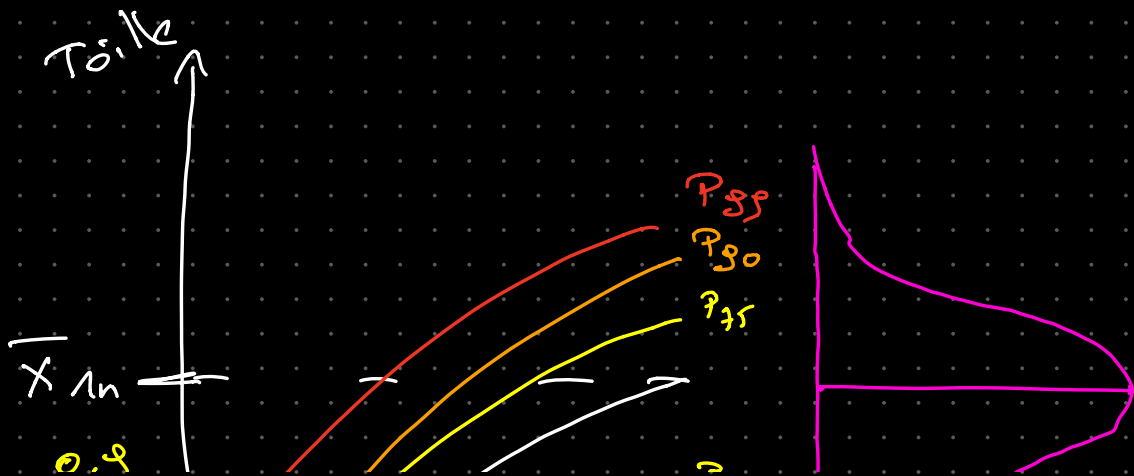
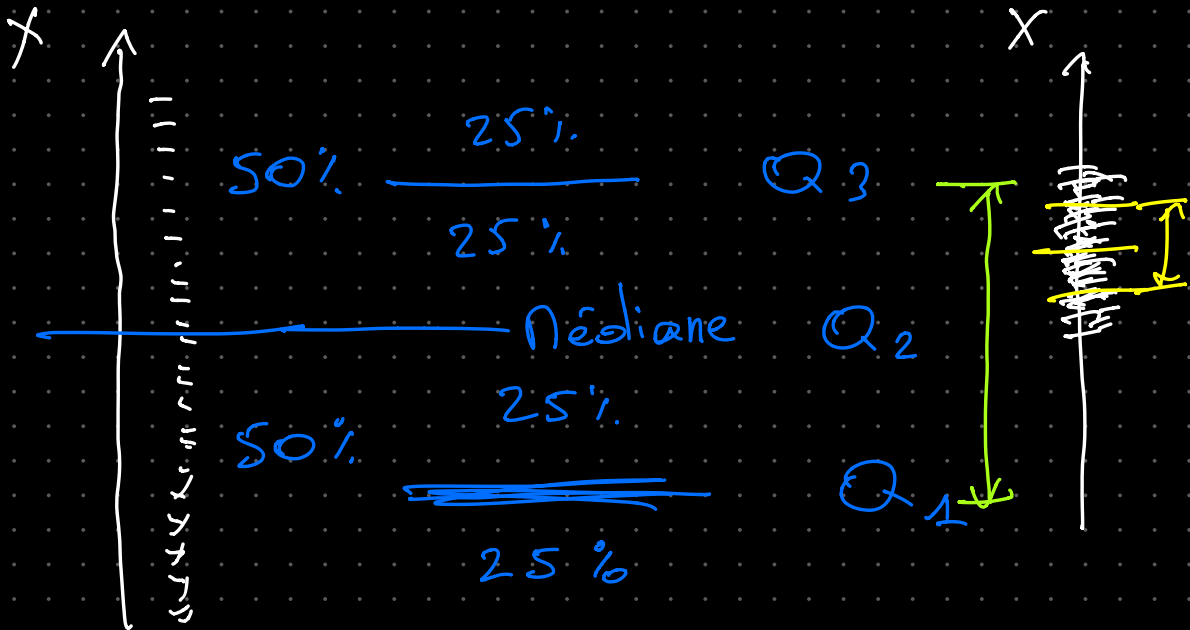
S ↓

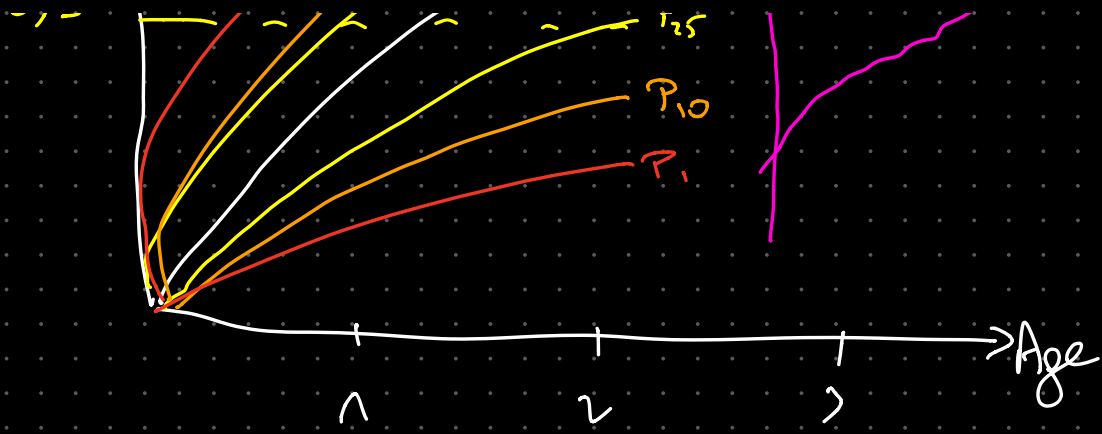
B



S ↑

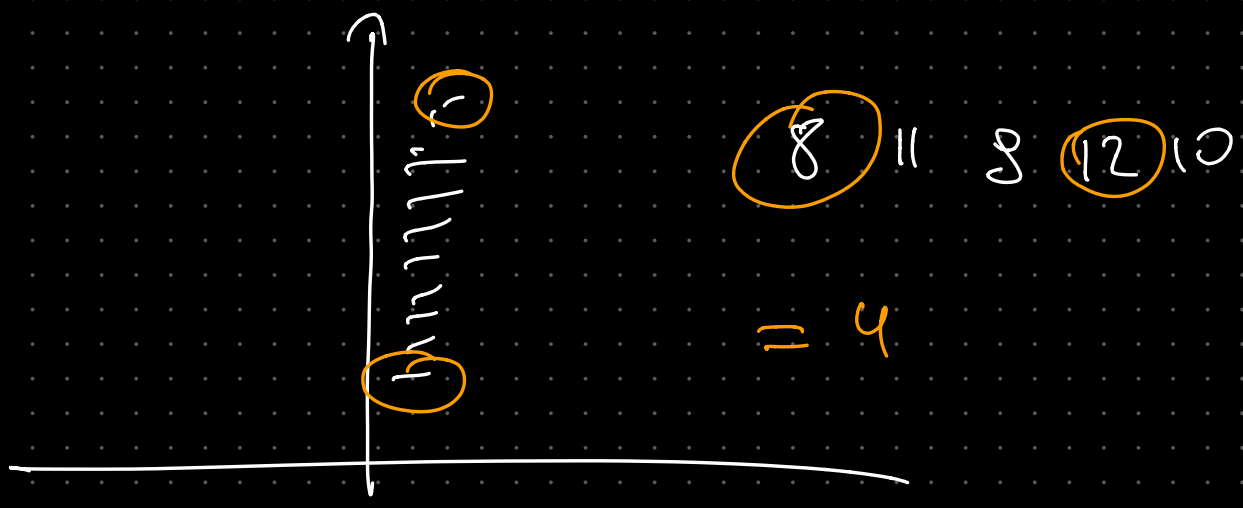
Etendue Inter Quartiles = $Q_3 - Q_1$
 Inter Quartiles Range





Etendue

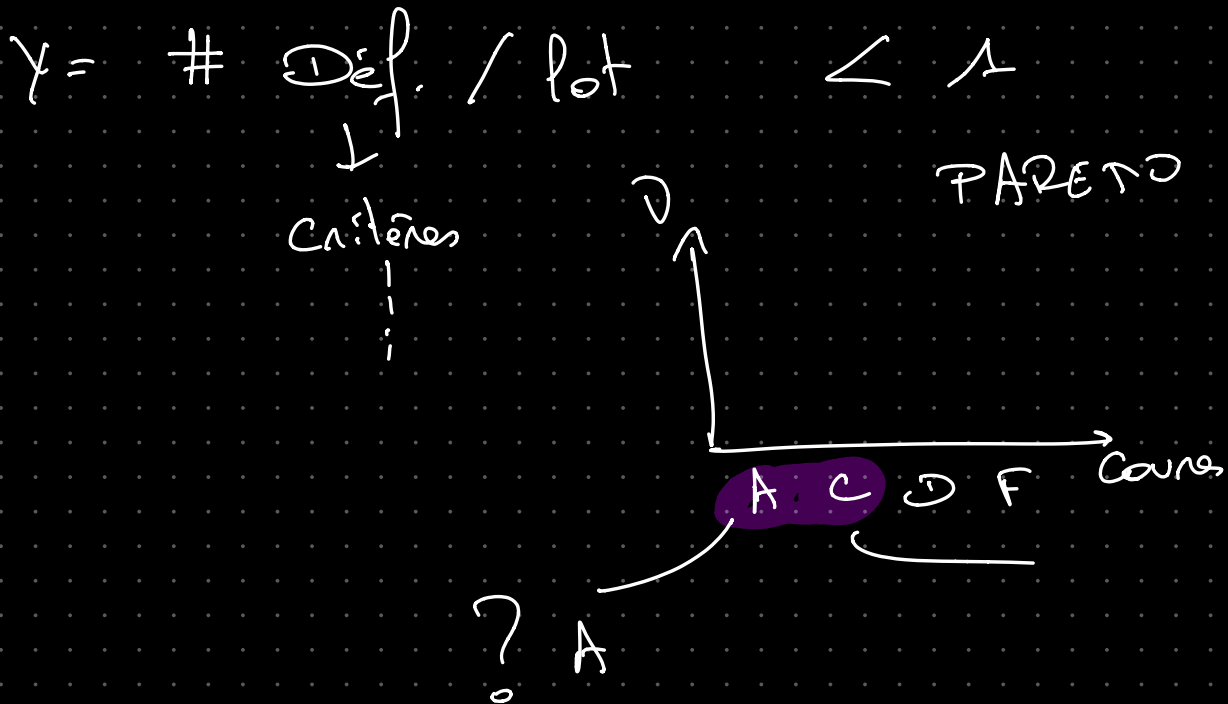
MAX - MIN



griffes
quadrés de PA
microparticules

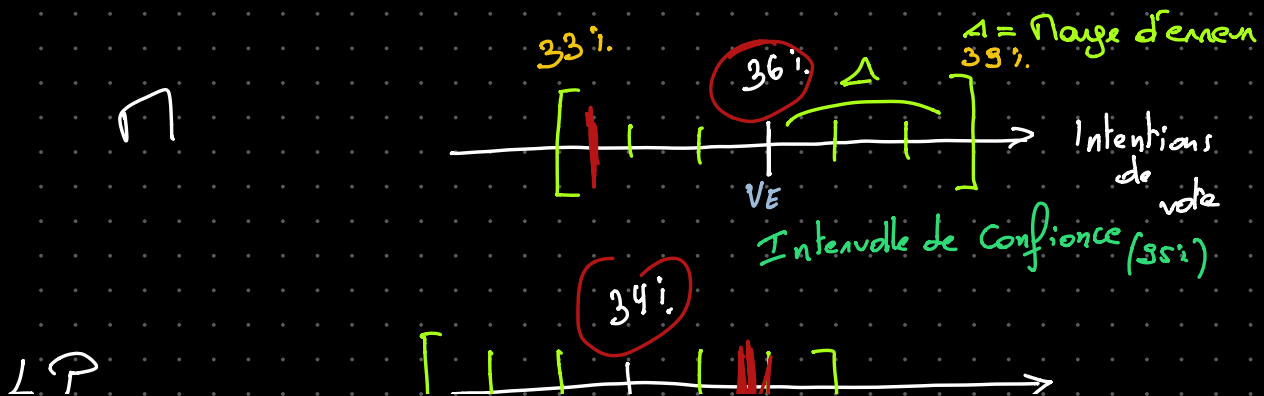
CTQs = faux positifs
1 1 1 1 1

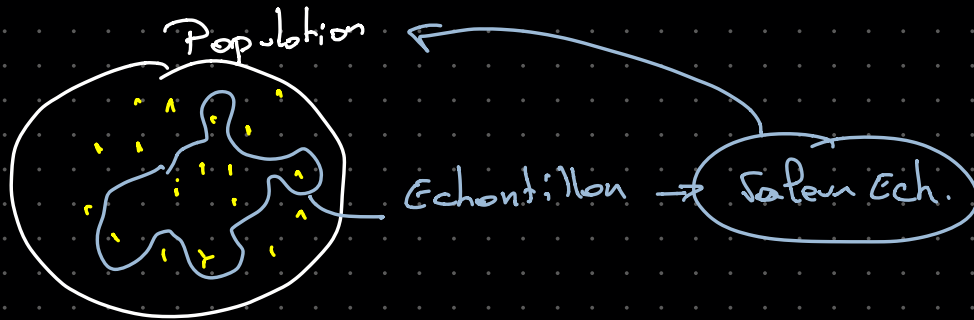
Hiere en. lene,



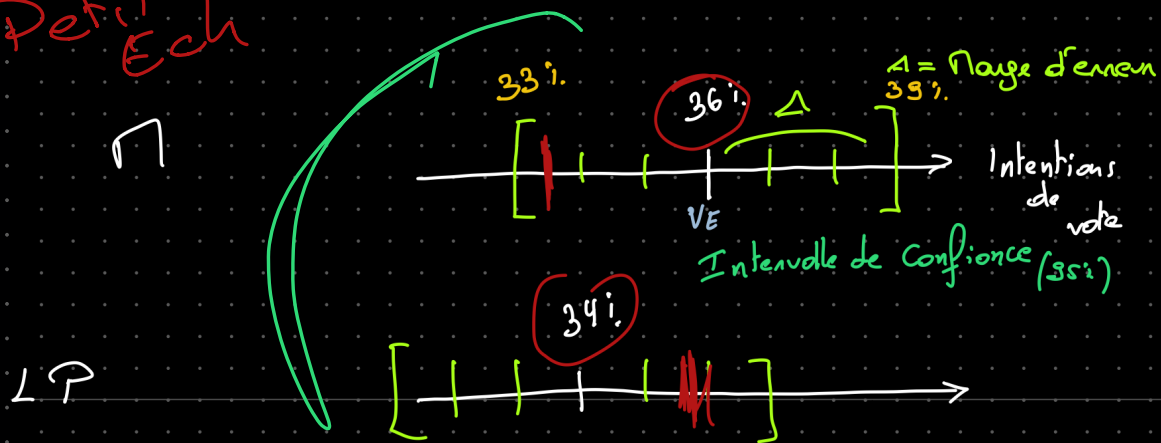
ASN ✓

Projet 6σ → Capabilité S.N.

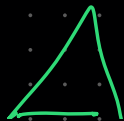
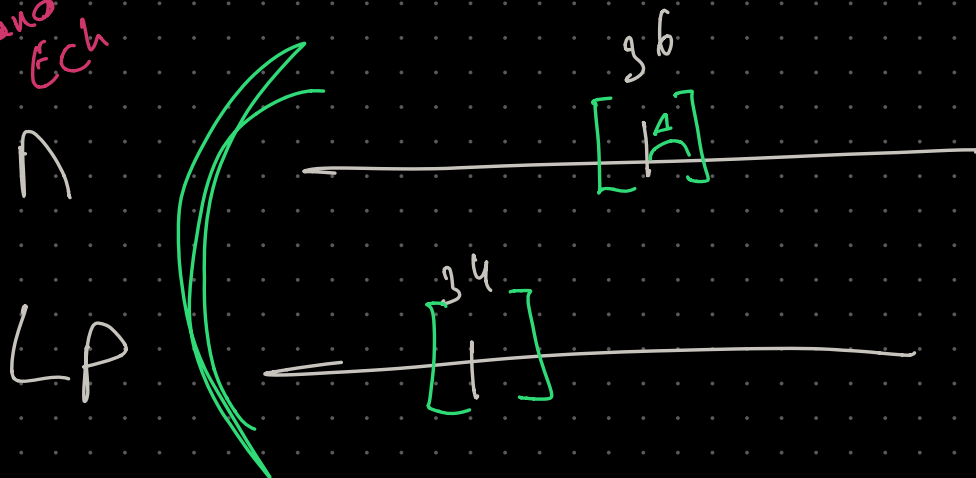




Petit Ech



Grand Ech



données historique

Homogénéité
Hétérogénéité

Defect	0,5	0,9	○
ok	0,5	0,1	
	Métér. ↑↑	Métér. ↓	

Binaire

$$n = \left(\frac{1,96}{\Delta_A} \right)^2$$

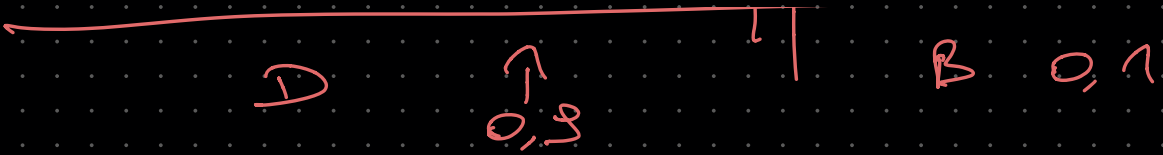
$$p \cdot (1-p)$$

0,5 (1-0,5)

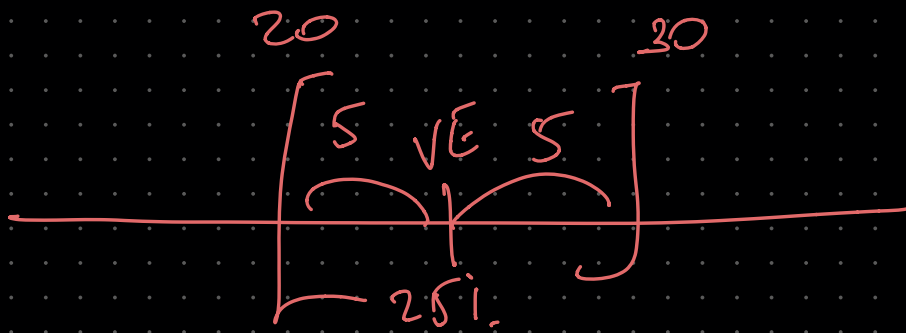
↳ p = proba d'un cas

1-p = proba d'autre

Métér. ↑	D	0,5	B	0,5
M ↑		↓		
Métér. ↓		0,1		0,9
M ↓				



VE ABSOLUE

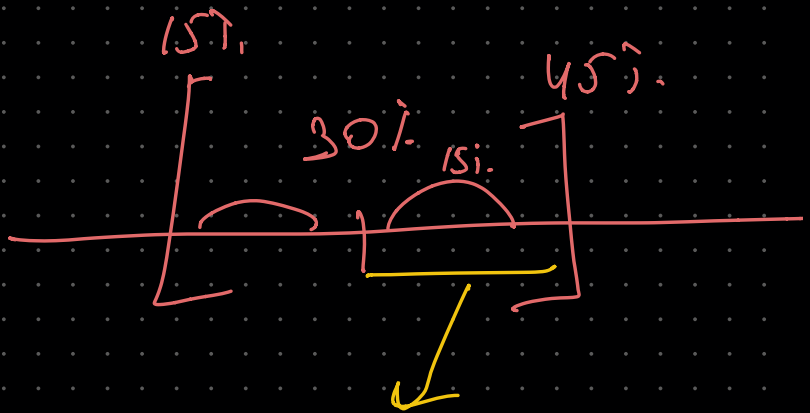


$$\Delta = 5i.$$

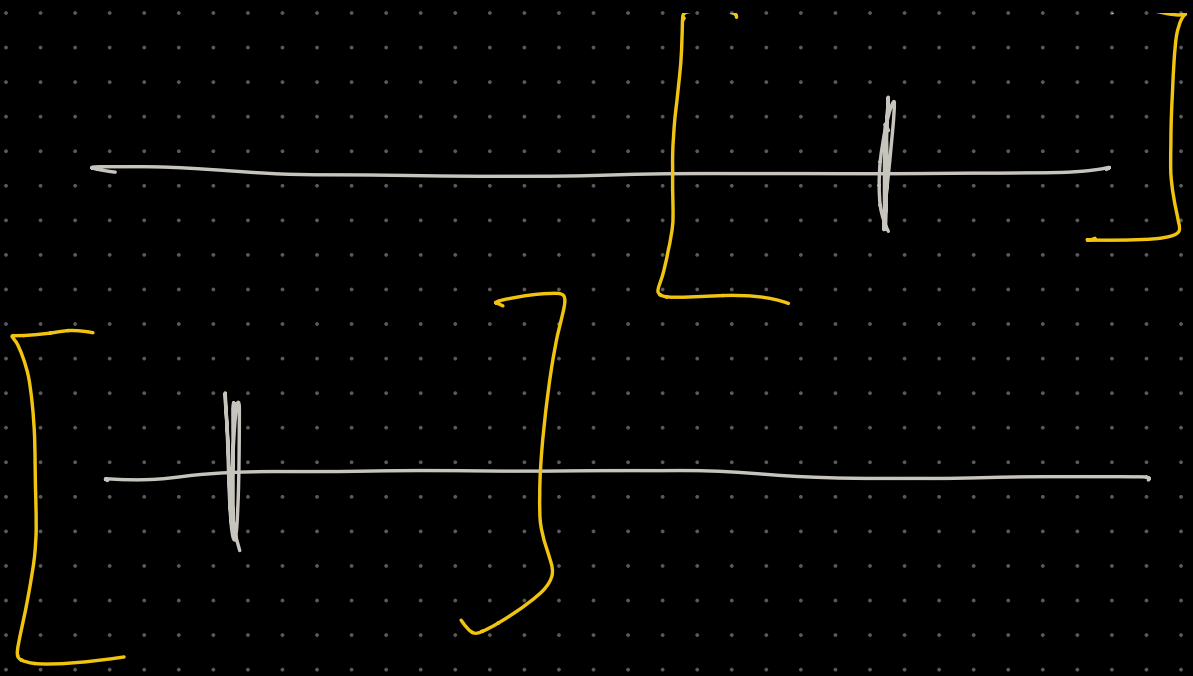
VE RELATIVE

$$VE = 30i.$$

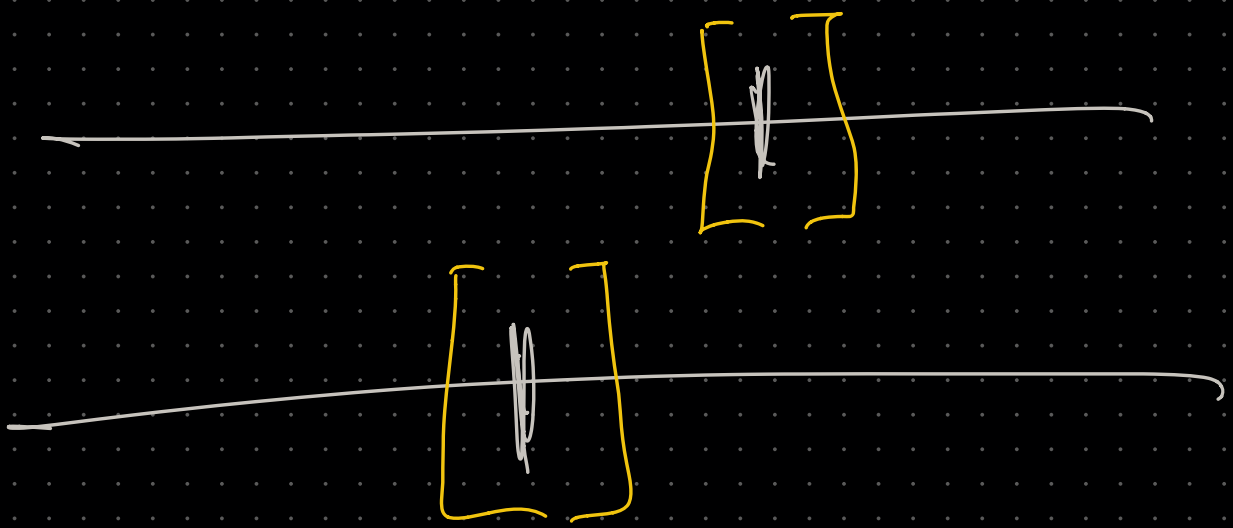
$$A_R = 50i.$$



$$VE \times A_R = 30i \cdot 50i = 15i.$$



OU

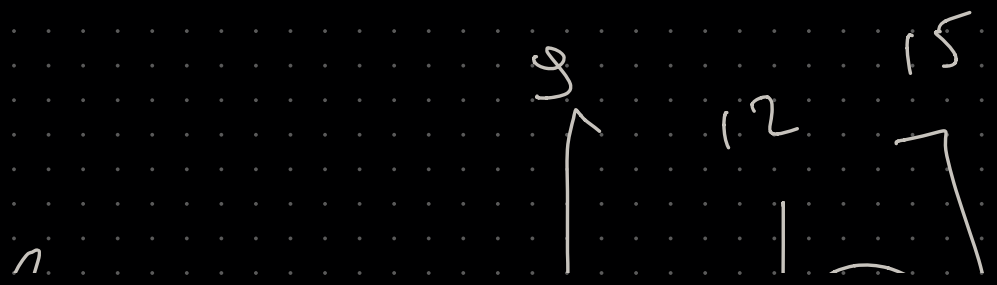
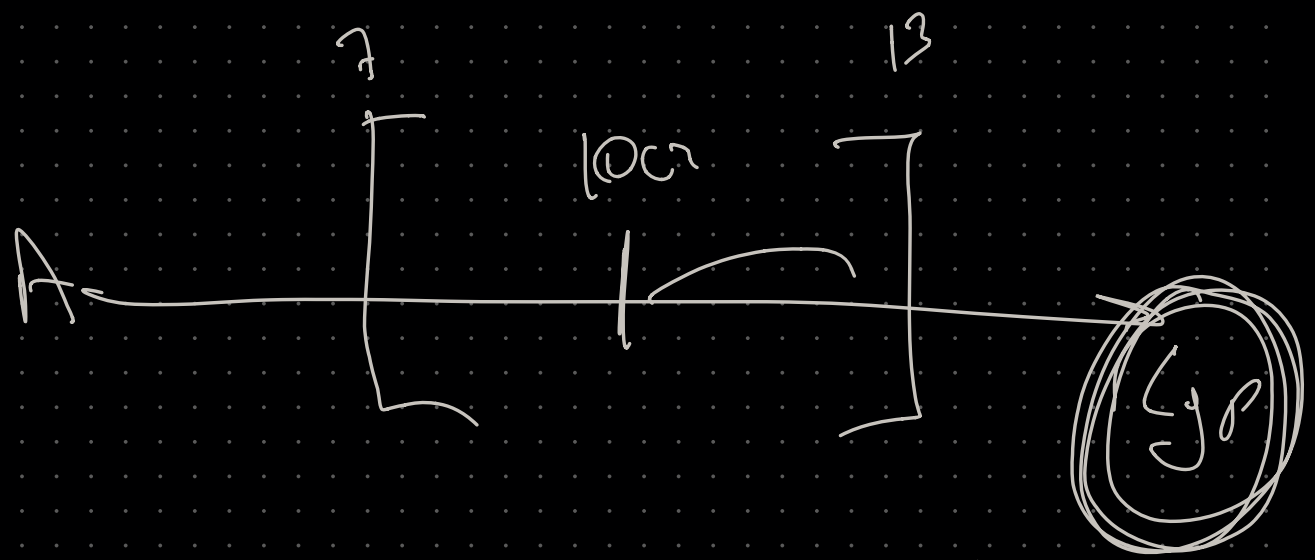
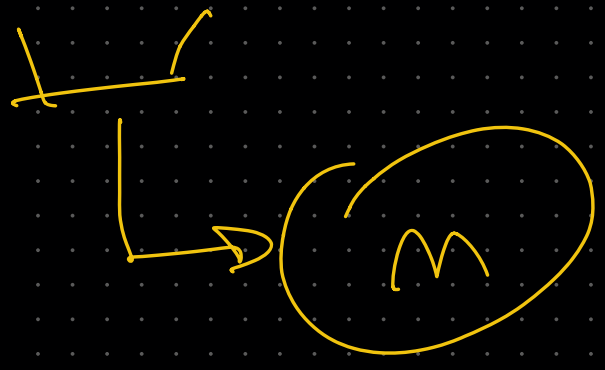


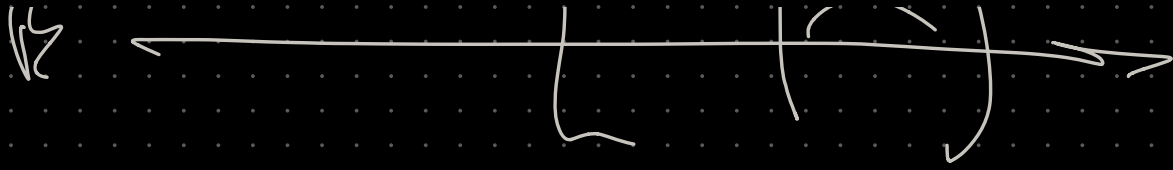
① TV Def historique 1000-2000

11/01/1975

(2) $\mathbb{N} \times \mathbb{Z}$ que j'accepte ?

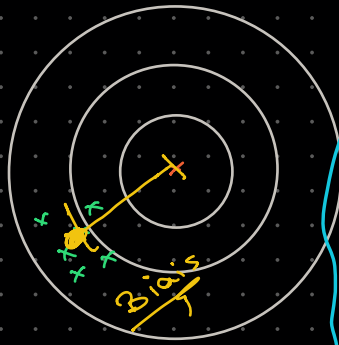
↳ Ampleur de la différence que je veux détecter



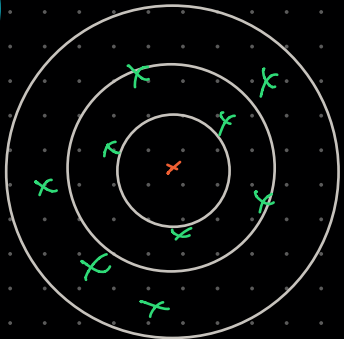


13h40_x

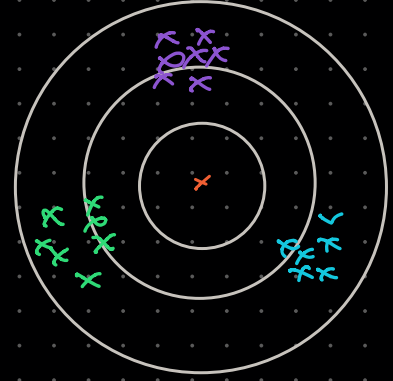
28



Exactitude
Accuracy



Répétabilité



Reproductibles
PRECISION

$r = \text{Distance}$

x_1 : charge
 x_2 : type hélicoptère
 x_3 : hauteur

x_5 suspects

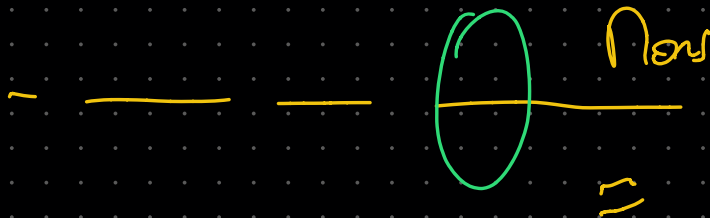
ASO	EXCITATION	REPET.	RÉPRO	STABILITE
γ	✓	✓	✓	✓
x_1	✓	✓	✓	✓
x_2	✓	✓	✓	✓
x_3	✓	✓	✓	✓

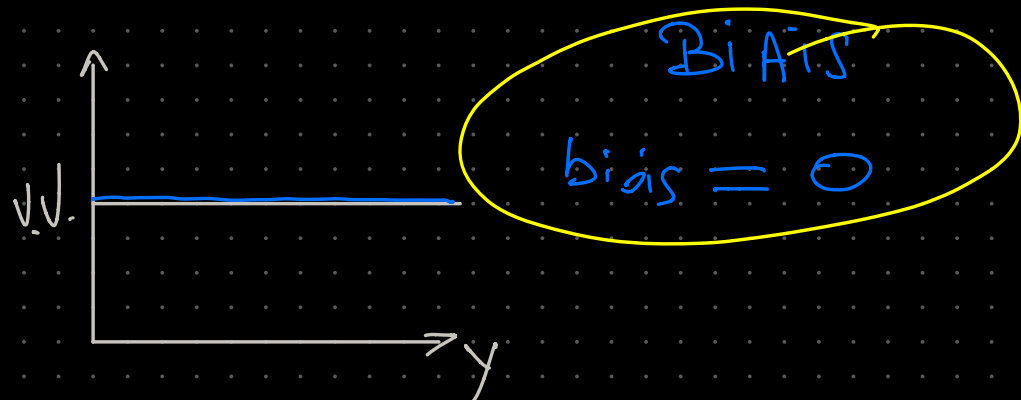
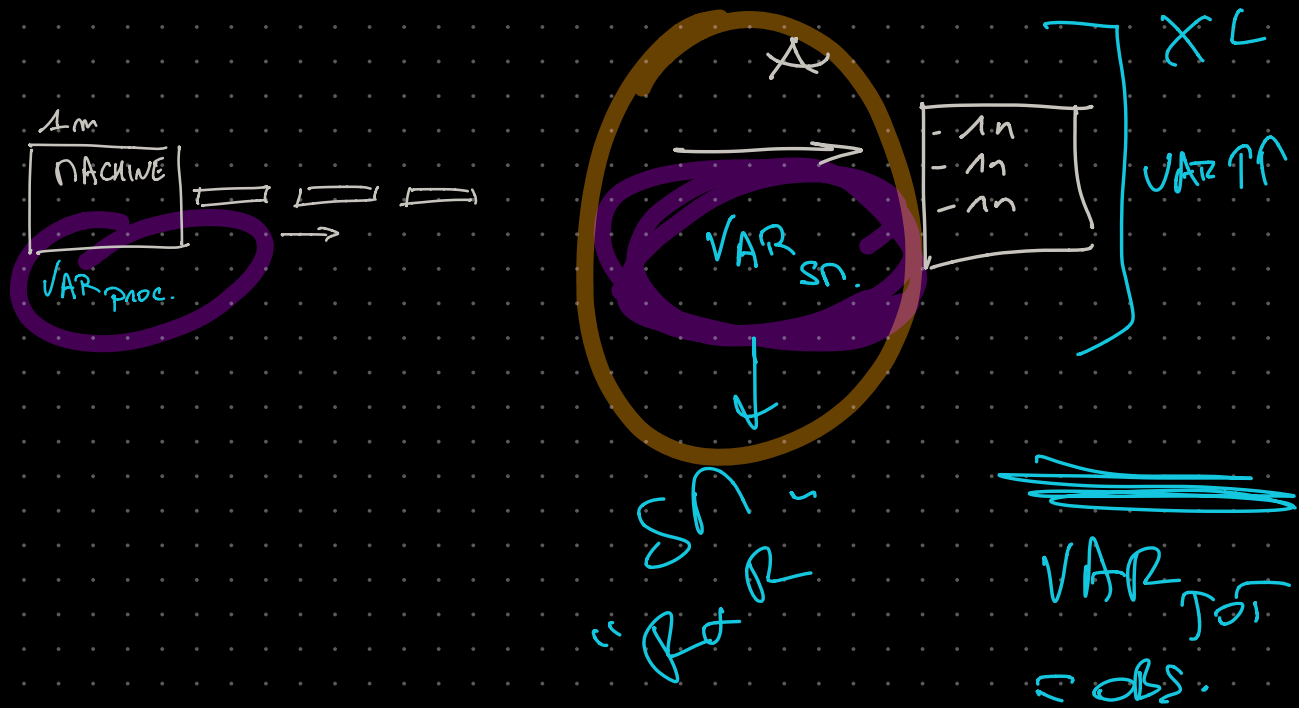
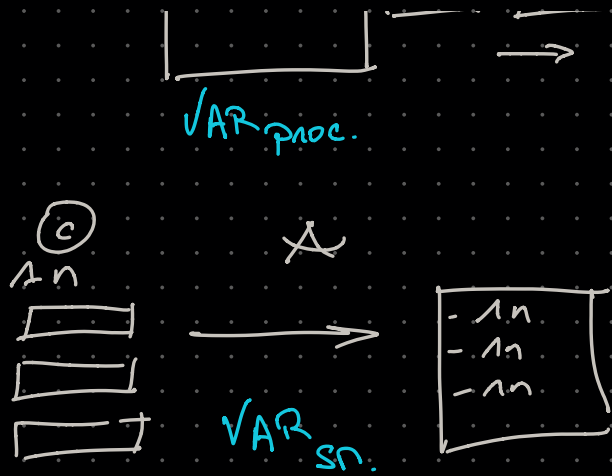
CTQ = retard camion

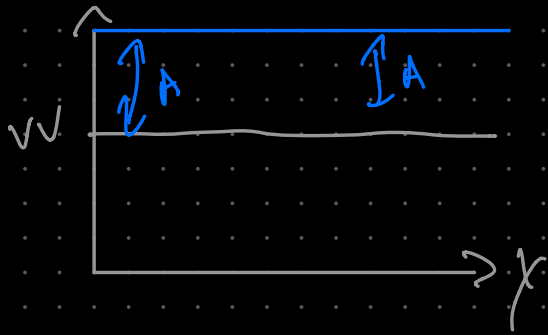
γ_1 : retard / à temps

γ_2 : différence tel jour prévu et réel

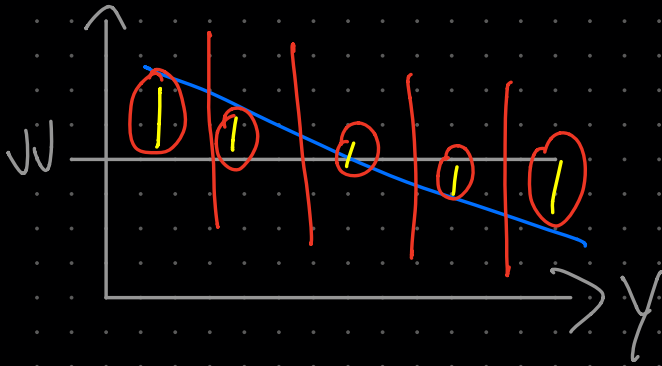
γ_3 : débois acheminement







$$\text{Biais} = A = +3$$

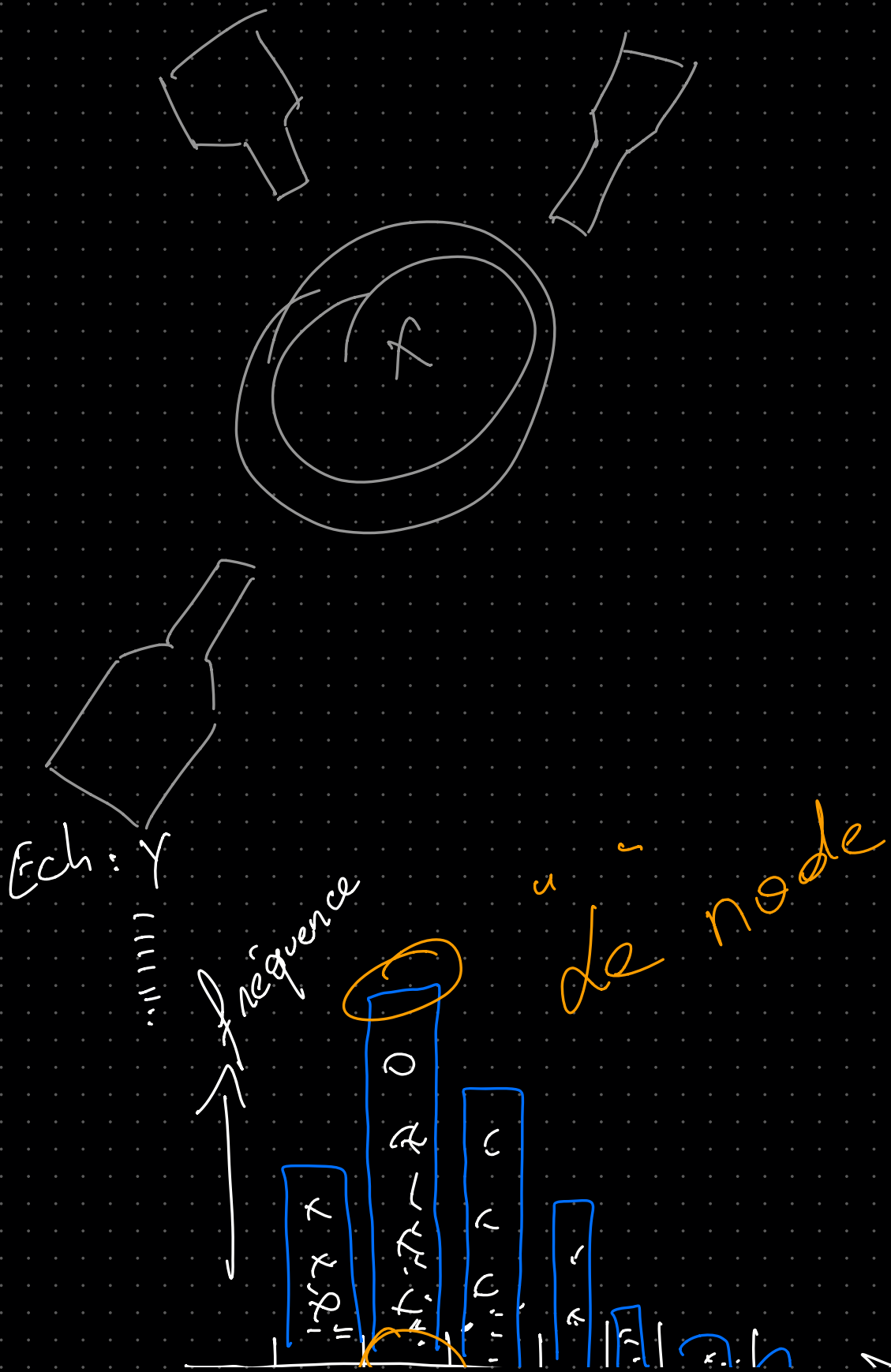


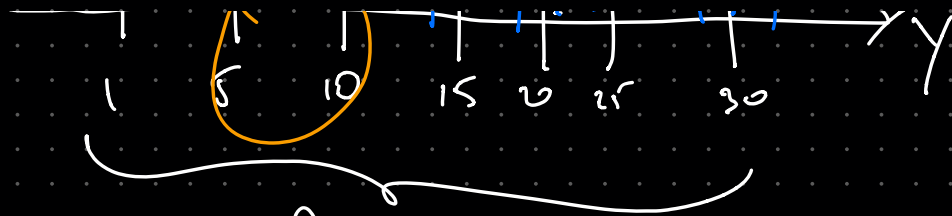
Biais Linéaire

$$\text{Biais} = A + 3x$$

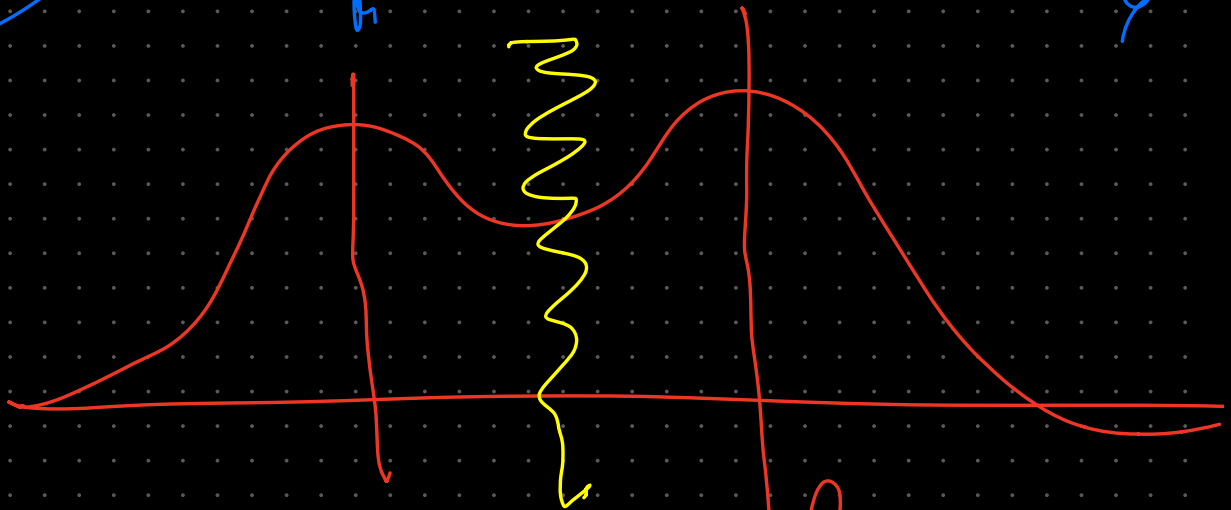
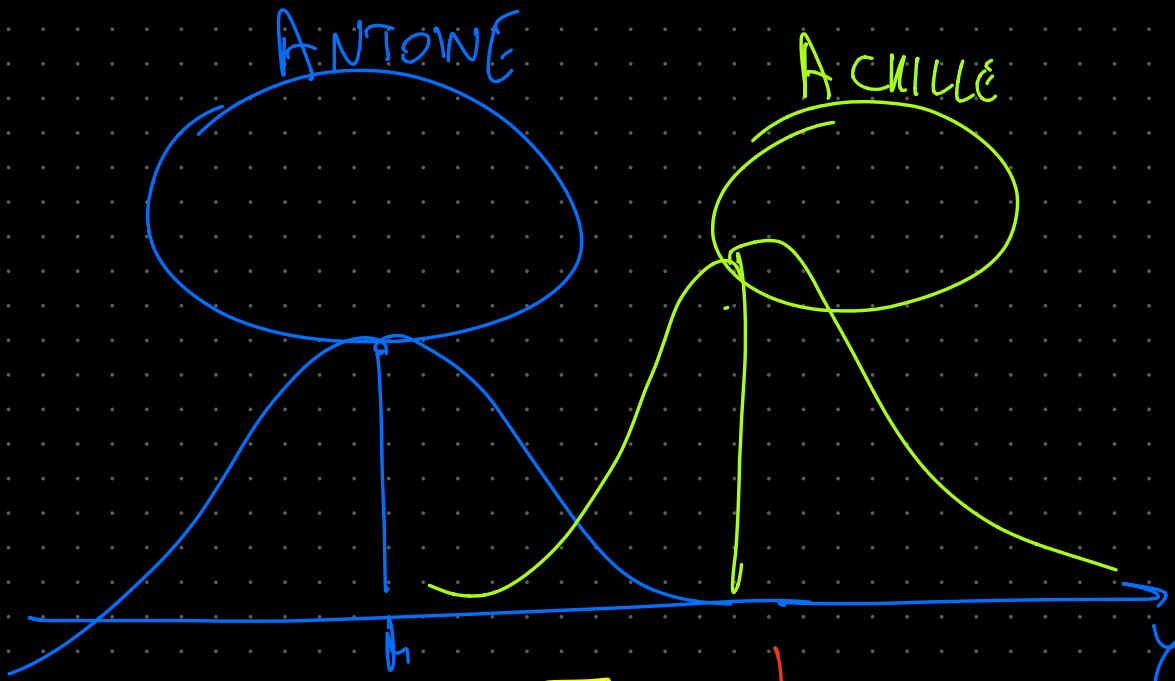
$$Y = A + 3 \cdot X$$

$$15 \text{ h } 35$$

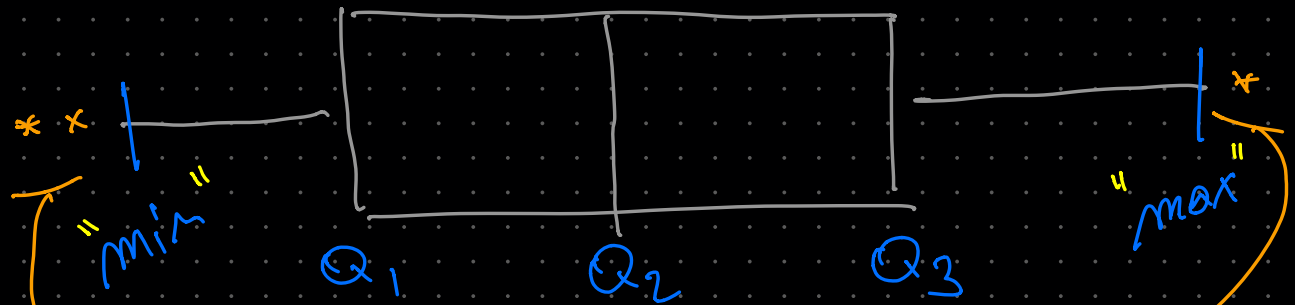
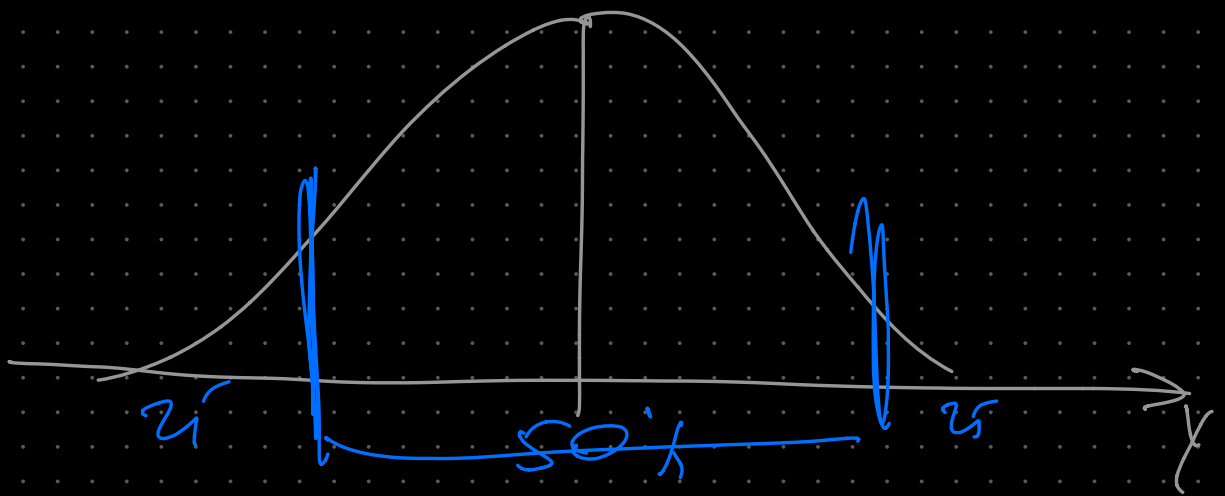




classes

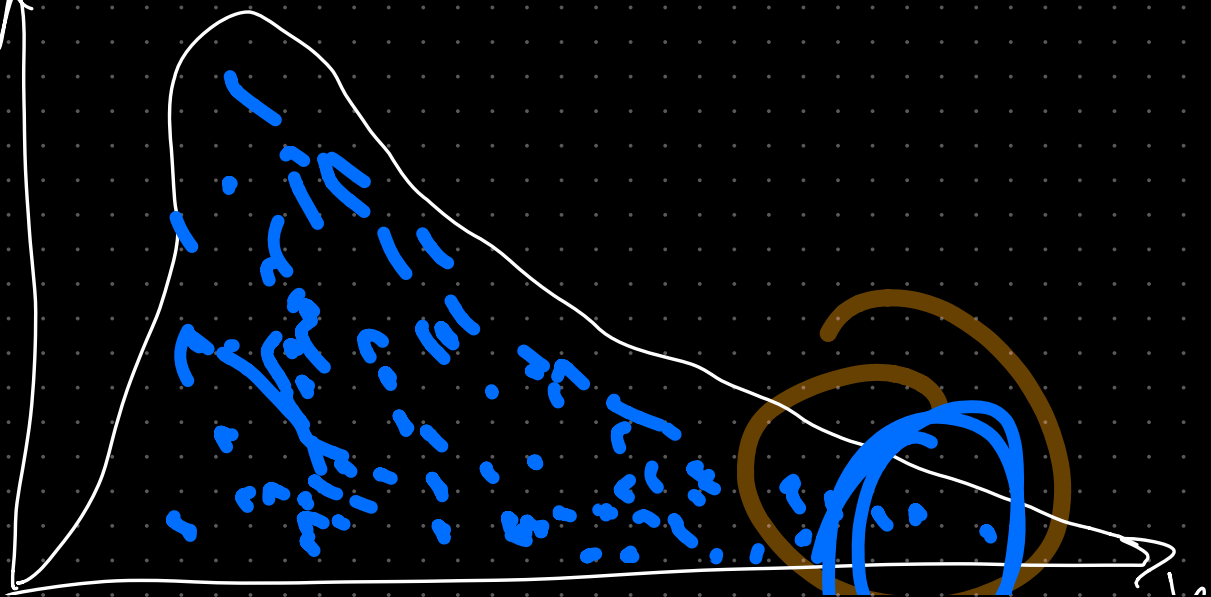


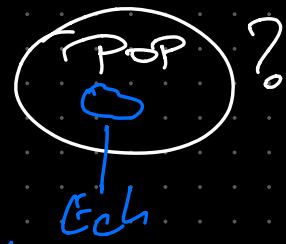
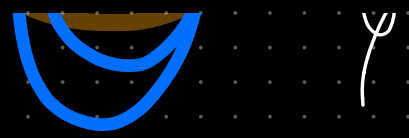
Binsdale



Werte oberer

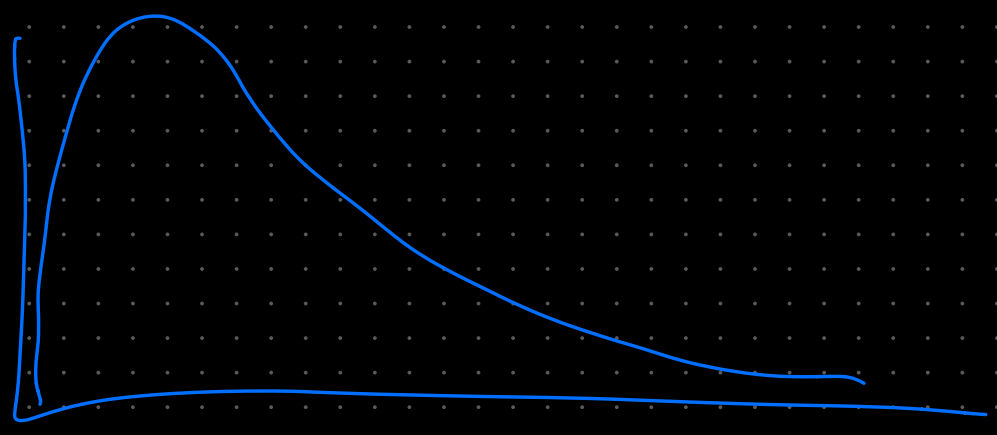
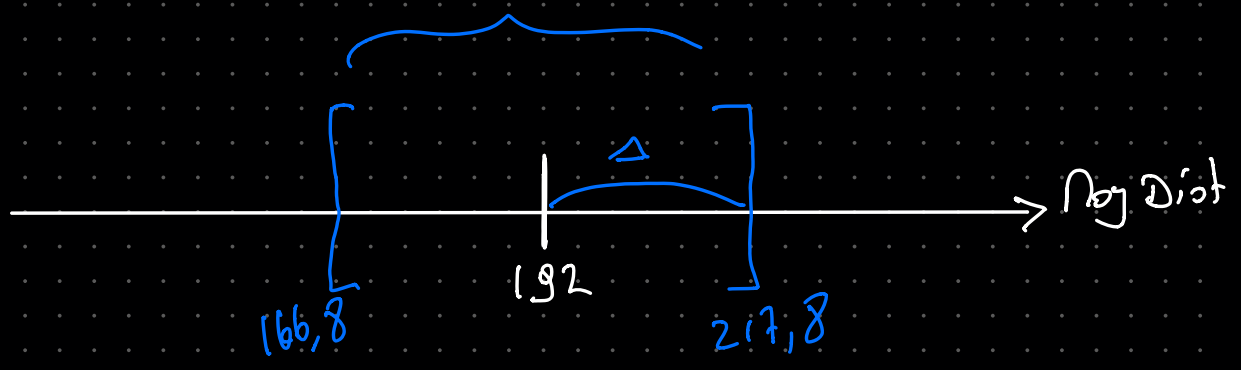
freq





Moyenne = 182

Moyenne
Population



1 2 3 4 5 6 7 8 9 10
Volum $n = 25$
5,5
2

Département RH

Exact.

Préc. \leftarrow répétibilité
reproductibilité

φ DEFINE iden YB

φ MEASURE

1. $\gamma \rightarrow$ définit op.
 \rightarrow Specs (cible)
 \rightarrow résolution

2. $X_s \rightarrow$ Ishikawa

3. Echantillon
stratégie d'éch. \leftarrow aléatoire
stratifié

taille éch

- 4. ASN → Exactitude
 - Précision
 - stabilité

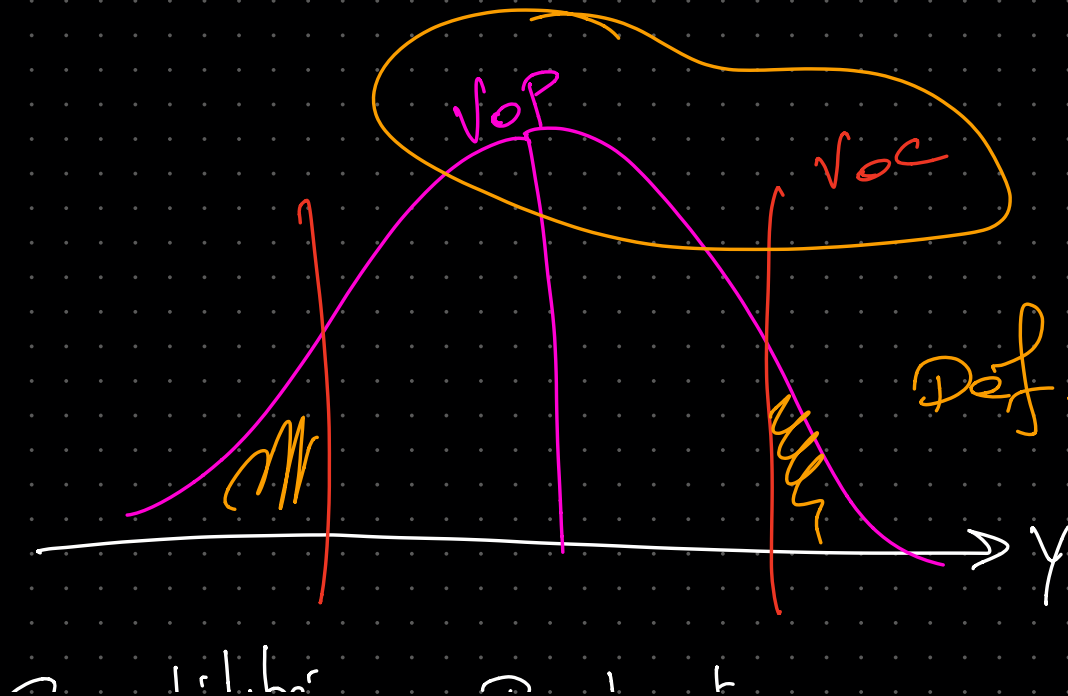
5. Collecte données

- 6. Clean data? → histogramme fréquent : Binomial?
 - bon nombre de vols. aberrants?
 - run chart : tendance?

- 7. Soie of Process → Y Normal?
 - Tendance Centrale
 - Dispersion

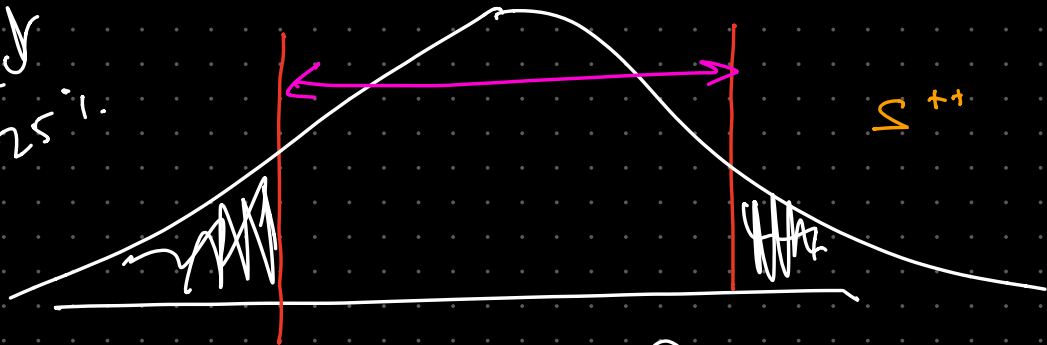
N		pas N
\bar{Y}		red σ, σ_3
s		EIG

8. Capacité

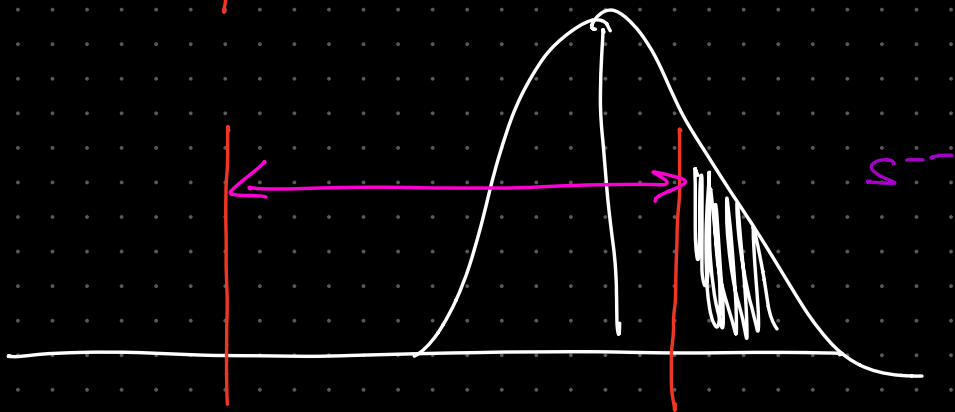


- Capabilité → Kunden!
- T-Defectur
- DPN0

Tx Defect = 25%



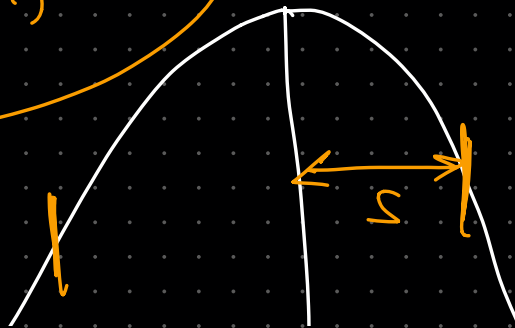
~ 25%

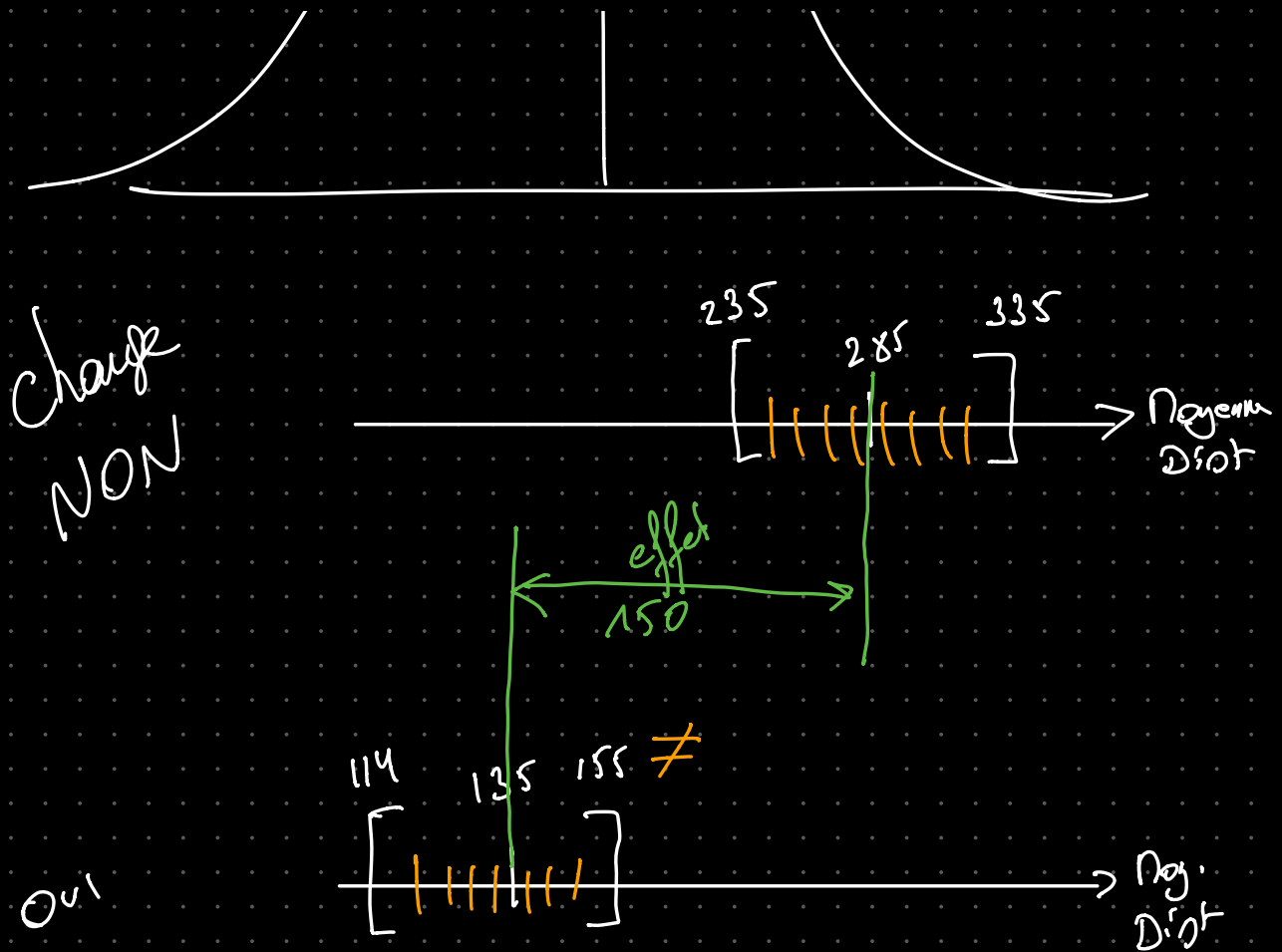


$$C_p = \frac{LSS - LST}{6s}$$

$C_p \downarrow$
 $C_p \uparrow$

$C_p > 1,33$





Il y a une différence significative de noyaux de Diot en fonction de la charge

⇔ la charge a un effet s/ le noy. Diot.

$$n = \left(\frac{1,86 \text{ s}}{\Delta} \right)^2$$

$$\Delta = \frac{1,86 \cdot \text{s}}{\sqrt{n}}$$

236,2

(ABS)

285

333,8

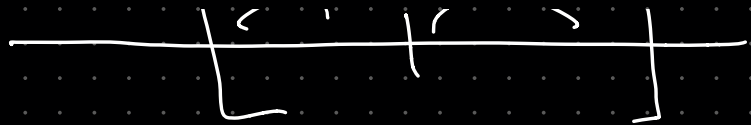
mm

△

△

△

NON



$$s = 188$$

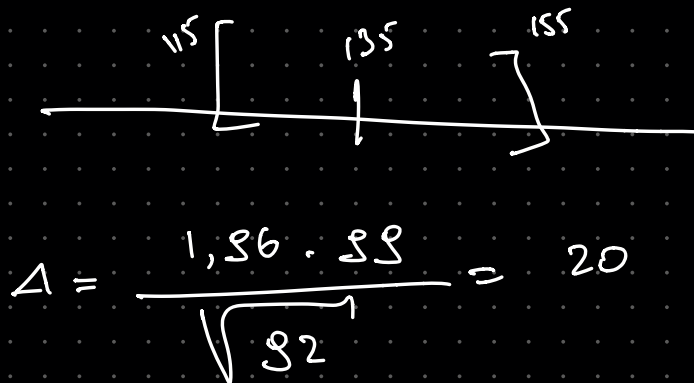
$$m = 57$$

$$\Delta = \frac{1,86 \cdot 188}{\sqrt{57}} = 48,8$$

OUI

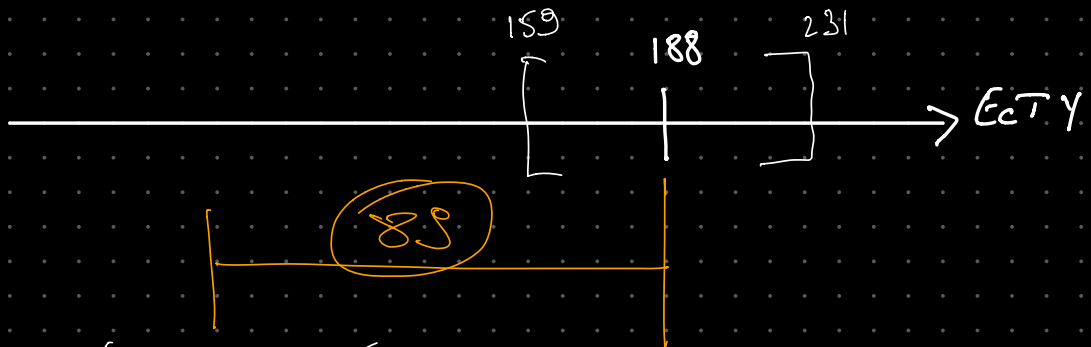
$$s = 89$$

$$m = 82$$



$$\Delta = \frac{1,86 \cdot 89}{\sqrt{82}} = 20$$

NON



OUI



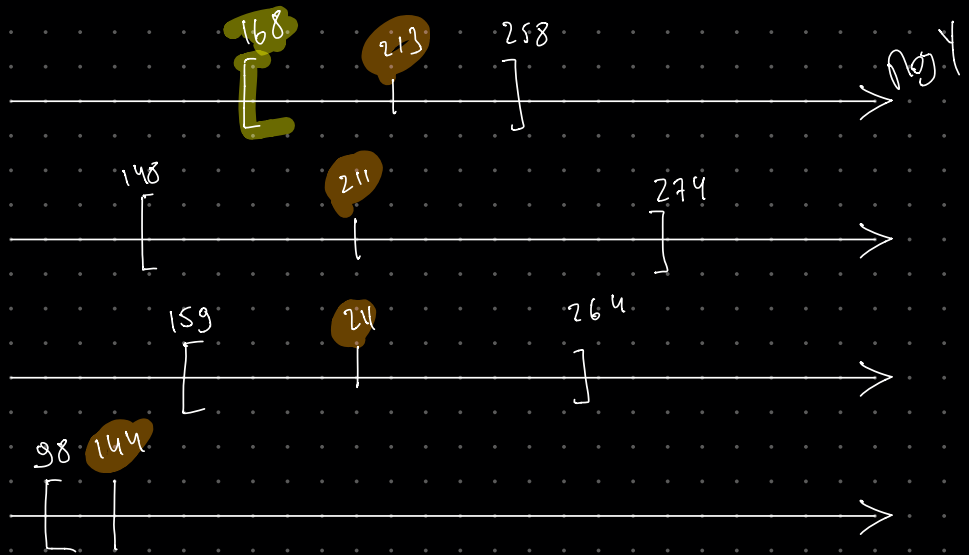
de charge a un effet significatif sur
l'éc.T. de la Distance.

Batgirl

Batman

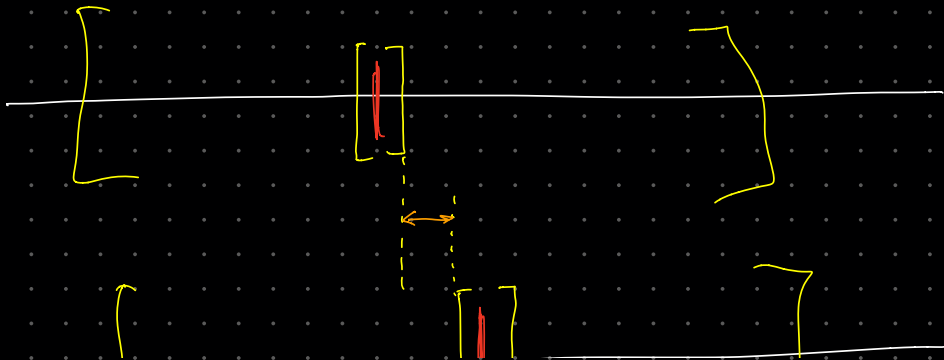
Spiderman

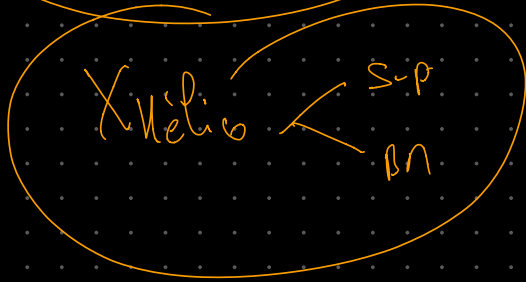
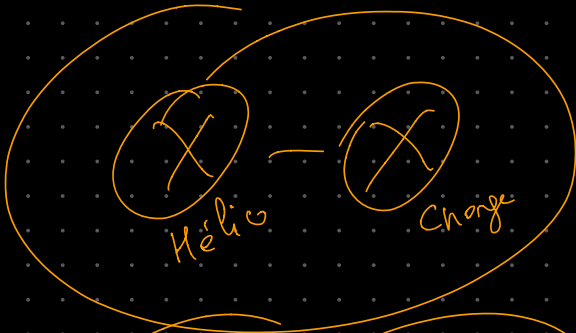
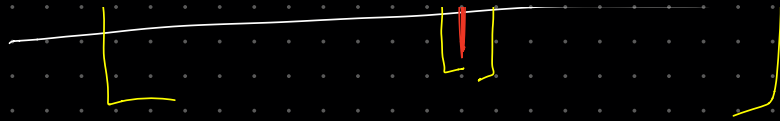
Superman



Nous n'avons pas vu de différence significative
no-s considérons donc que l'hélico n'a pas
d'effet s/ la noyenne de la Distorta

W





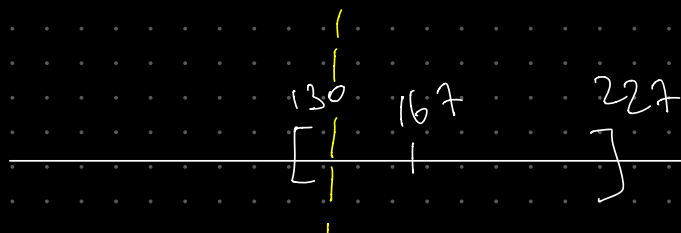
Non ionisable
valence

X
OC

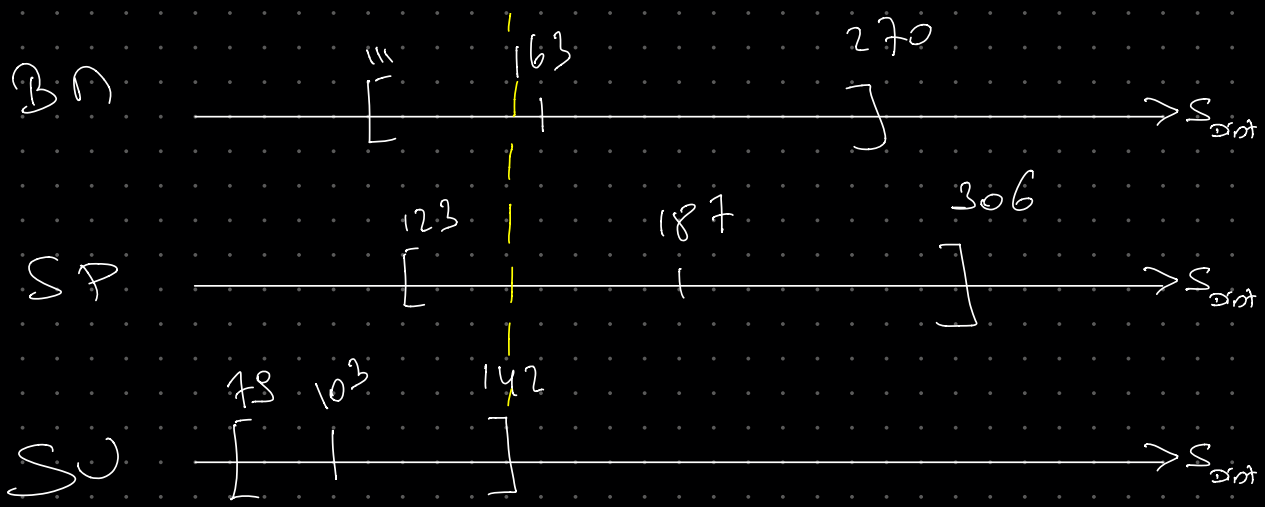
X_{hélio}
 $\alpha_1 = BN$
 $\alpha_2 = SN$

A3h05

BG



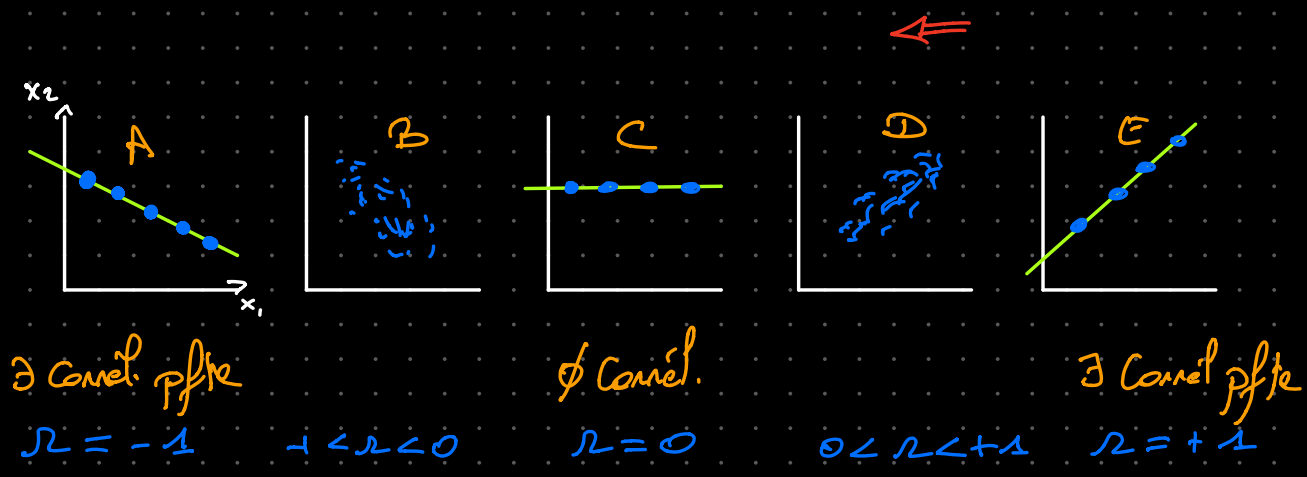
$\rightarrow S_{\text{crit}}$



de X Mélico n'a pas d'effet significatif sur la variabilité (éc.t) de la Dist.
 \Rightarrow On considère qu'il n'a pas d'effet!

X continu \sim Y continu

CORRELATION \nrightarrow causalité

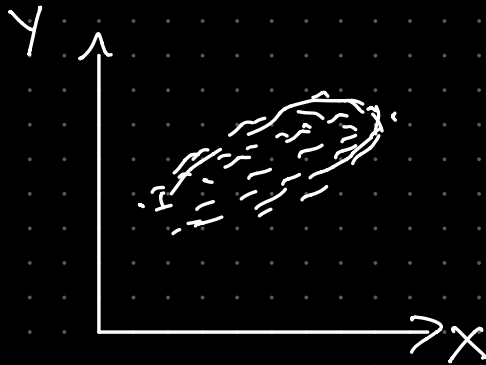


$r =$ indicateur de la force de la

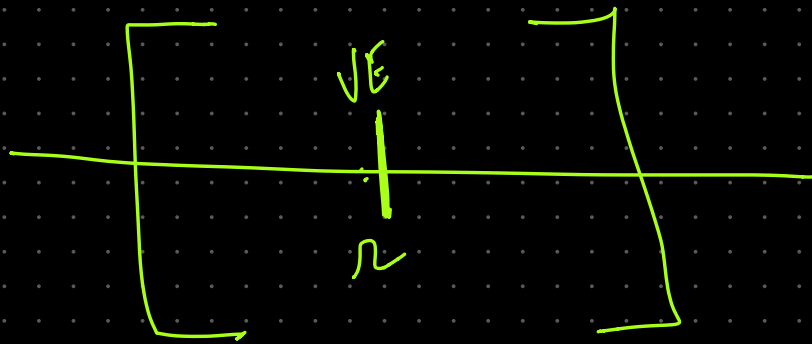
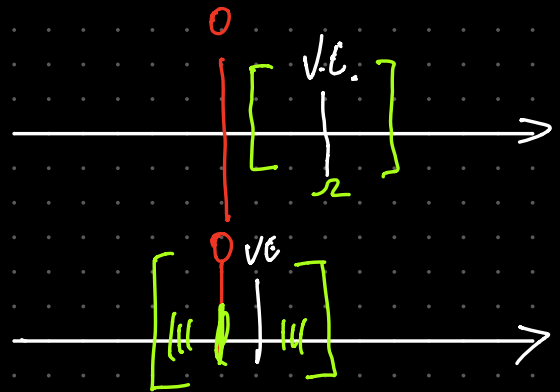
relat les 2 variables

"Coefficient de Corrélation"

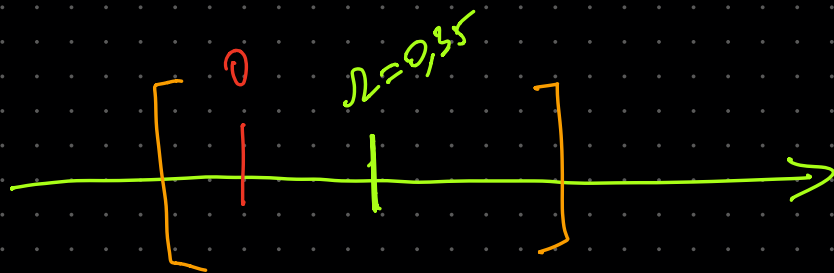
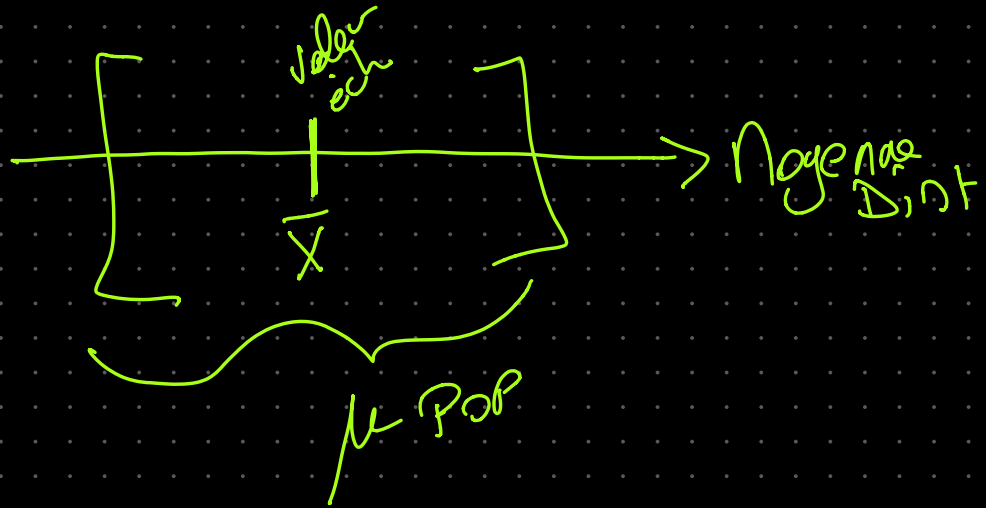
$$-1 \leq \rho \leq +1$$



$$\rightarrow \rho = \text{corr}$$



POT



POP		Ech
μ	moyenne	\bar{X}
0		-

r	coef. corr.	R^2
σ	éc. type	S

$$(r)^2 \Rightarrow R^2$$

Coef. de régression

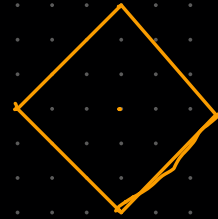
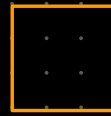
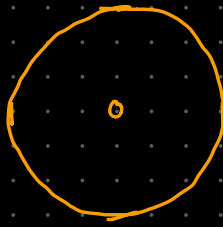
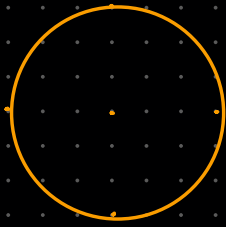
Proportion du comportement des
valeurs de Y expliquée par ces X.

$$r = 0,061$$

$$R^2 = (0,061)^2 = 0,0037$$

$$= 0,4\%$$

$$R^2 = 40\%$$



4 DEFINE iden YB

4 MEASURE

1. γ → définit op.
→ Specs (cible)
→ résolution

2. X_s → Ishikawa

3. Echantillon
stratégie d'éch. ← aléatoire stratifié
taille éch

4. ASN → Exactitude
→ Précision
→ stabilité

5. Collecte données

6. Clean data?

- histogramme fréquence : Bimodale?
- $b \hat{=} n$ outliers, vol. aberrant?
- run chart : tendance?

7. Voie of Process

- Y Normal? N
 - Tendance Centrale \bar{Y}
 - Dispersion S
- pos N
Med Q_1, Q_3
EIG

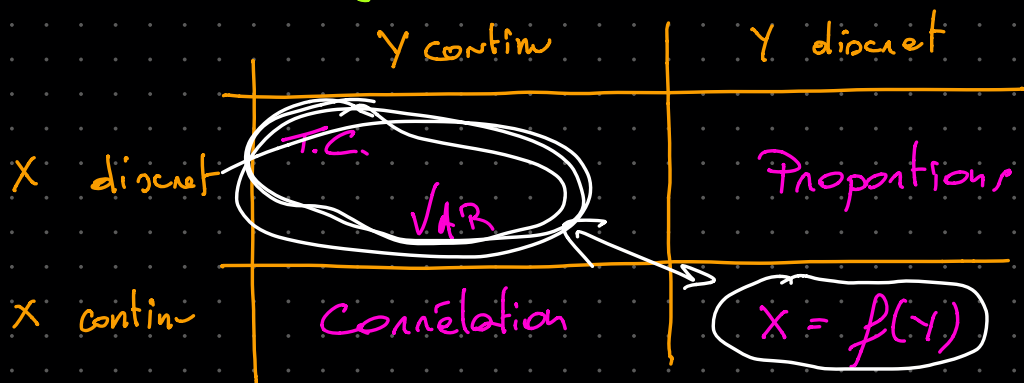
8. Capabilité

Φ ANALYSE

1. Etudier relat° X - Y

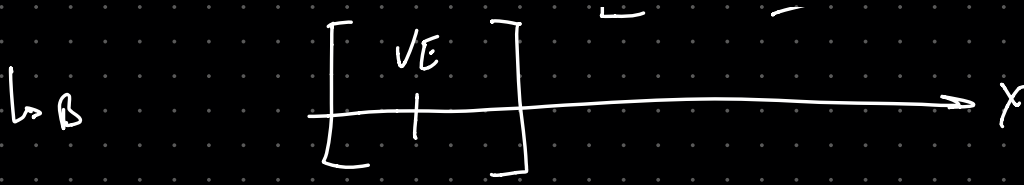
$X_1, \dots, X_{10} \rightarrow X_5$ suspect

$X_1, X_3, X_4, X_6, X_8 \rightarrow X_n$ véritables

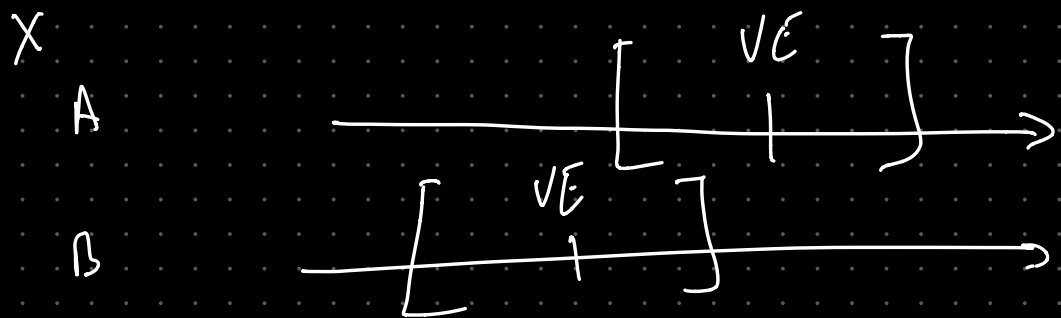


X
GA





⇒ effet signif.



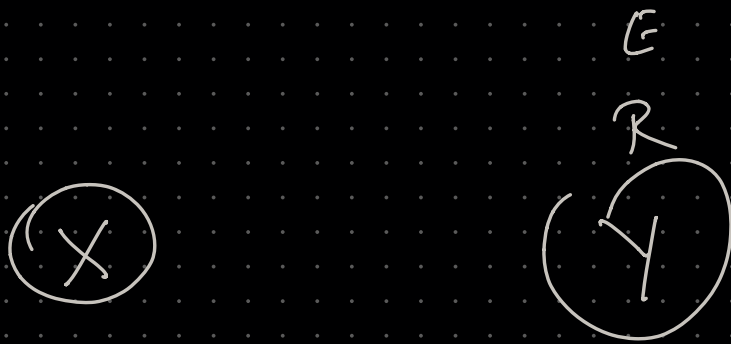
⇒ on considère qu'il n'y a pas d'effet.

$$Y_{\text{CONT}} = f(x)_{\text{DISCR.}}$$

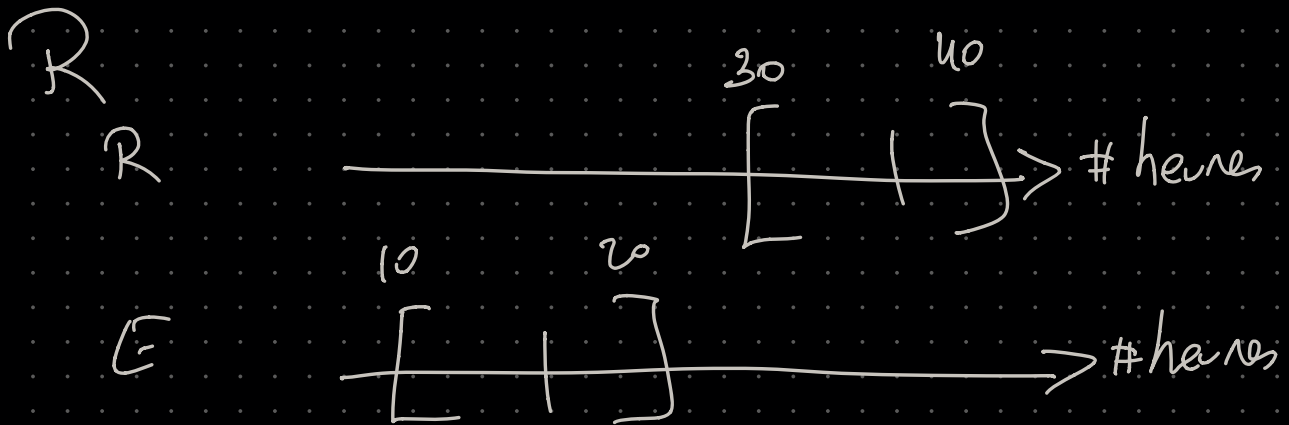
$$\text{CONT } X \text{ } Y = f(\text{DISCR. } Y) \text{ } X$$

||| → D. c. l. h. t

heures \longrightarrow résultat



Est-ce que le résultat a un effet
s/ # heures ?



de résultat a un effet signif.
s/ le # heures

Si on pose tel 30-40 h o étudié
ou + de chances de réussir

Si on passe les 10-20 h à étudier
on a + de chances d'échouer.

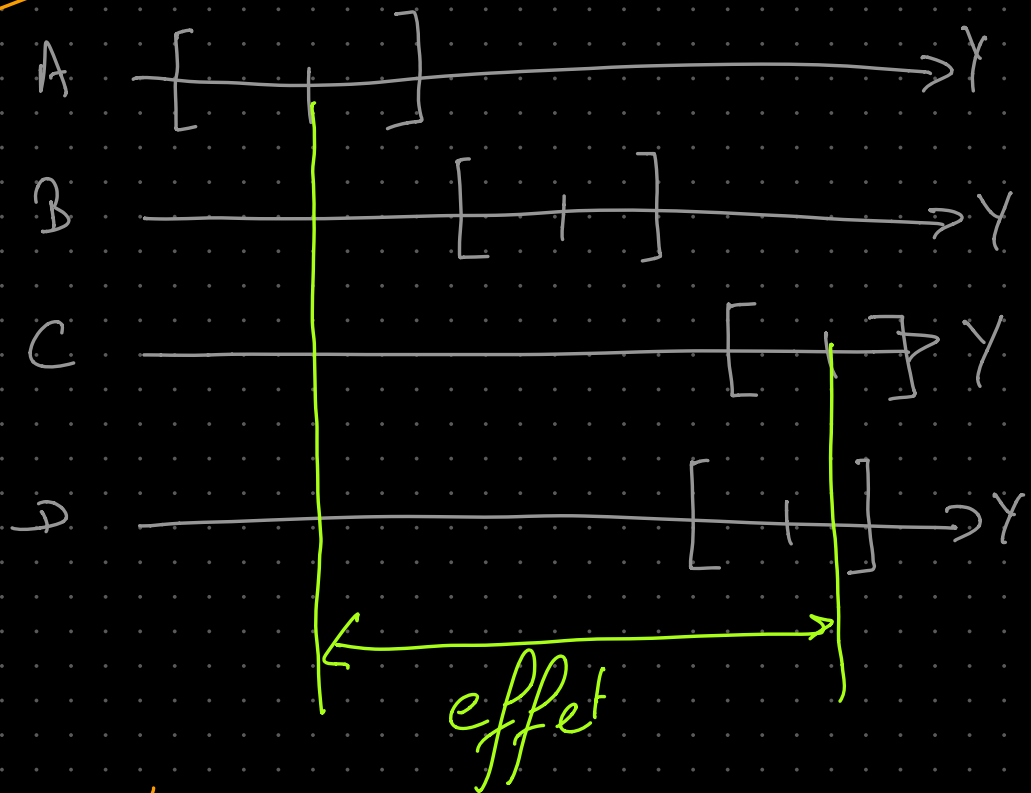
2. Hiérarchie X_i

$x_1, x_3, x_5, x_6, x_9 \rightarrow x_n$ véritables

$x_1, x_5, x_6 \rightarrow$ vital Few \Rightarrow soit effet
total s/ Y .

effet X DISCRET

X
type Hebb



effet X continu

ex 11

Si corrélation

↓
équation tel $x \sim y$

$$Y = 10 + 20 \cdot x_1$$

$$x_1: 1 - 2$$

$$\text{min } Y = 10 + 20 \cdot 1 = 30$$

$$\text{max } Y = 10 + 20 \cdot 2 = 50$$

effet 20

$$Y = 15 + 5 \cdot x_2$$

$$x_2: \frac{10 \div 100}{\underline{\quad}}$$

$$\text{min } Y = 15 + 5 \cdot 10 = 65$$

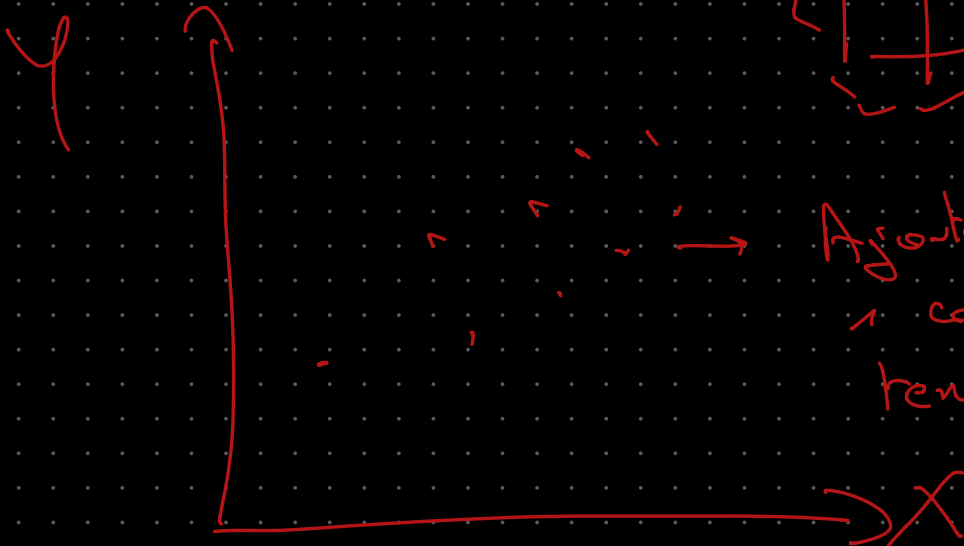
$$\text{max } Y = 15 + 5 \cdot 100 = 515$$

effet 450

XL

x	y

→ Ajouter
→ courbe de
tendance



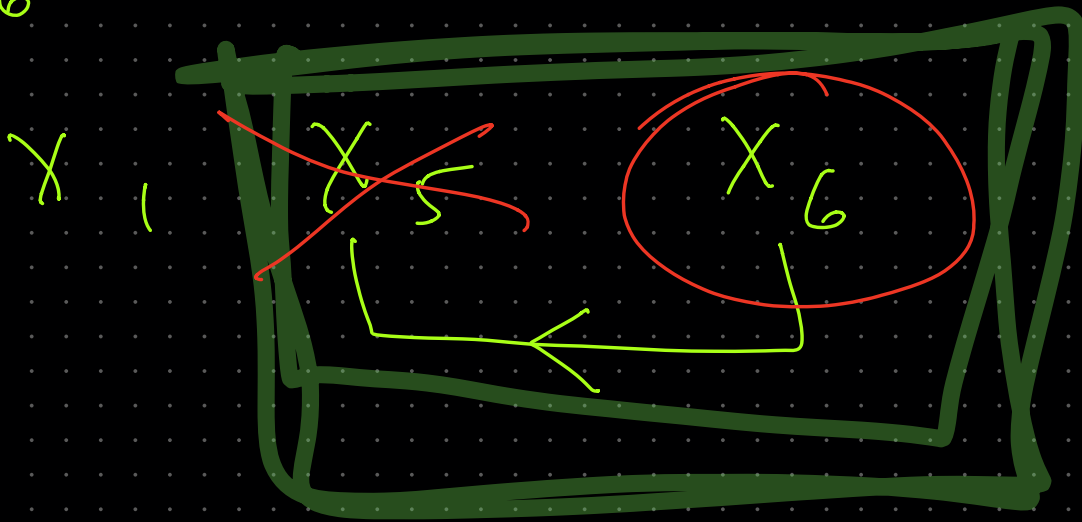
3. Recherche des Courbes nocives

$x_1, x_5, x_6 \rightarrow$ Vital Few \Rightarrow 80% effet total s/ y .

x_1 F--- Courbe nocive

x_5 <--- " " "

x_6 <--- " " "

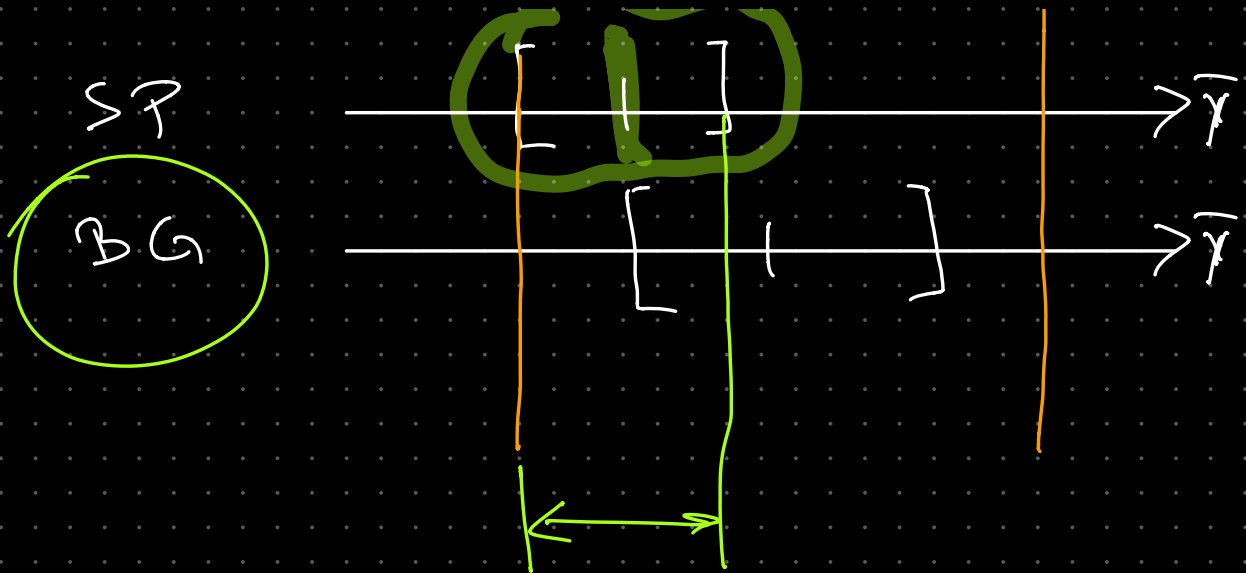


3σ



S_u





Rebond

- A. Solen caotchorc.
- B. Patofix /s charge
- C. tapis sounis /s cible
- ⋮

|

|||||

||

Tourpie

- A. Pointe /s charge
- B. Patofix /s charge
- C. Scotch /s charge

|

|

|

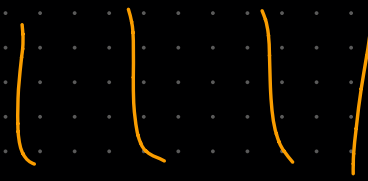
Verticalite

A. fil à plomb

B. Equerre : 2 din

C. laser

D. Plateforme



Multivoting
Matrice critères pondérés

Projet Pilote

Diot



T.C. $\bar{\gamma} = 50 \text{ n}\eta$

Var. $\epsilon = 10 \text{ n}\eta$

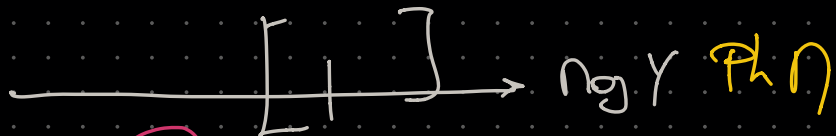
Capacité

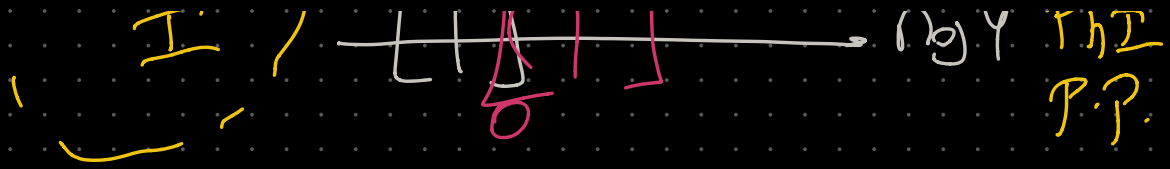
T^r Defect = 20%

Avant : $\bar{\gamma} = 120 \text{ n}\eta$

$\epsilon = 110 \text{ n}\eta$

= 80%





Diet	Phase
	C C C C C C C C C C H H H H H H H H H H

and of
 k x phase a
 effect of Diet
 ↳ T.C.
 ↳ Var.

Capabilité

φn

81,3%

$n = 150$

$$\Delta = 1,86 \cdot \sqrt{\frac{p \cdot (1-p)}{n}}$$

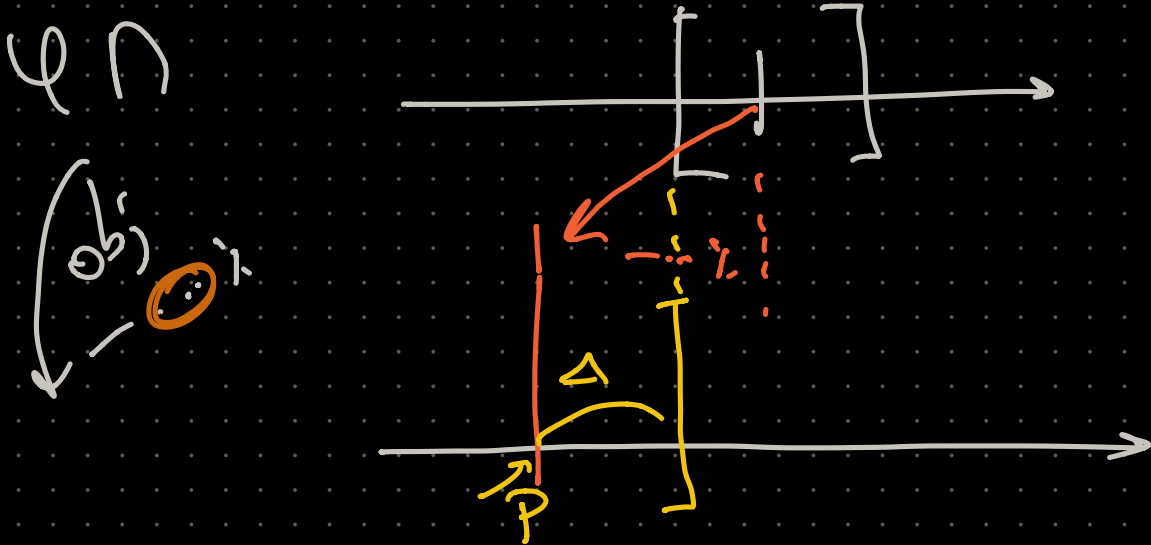
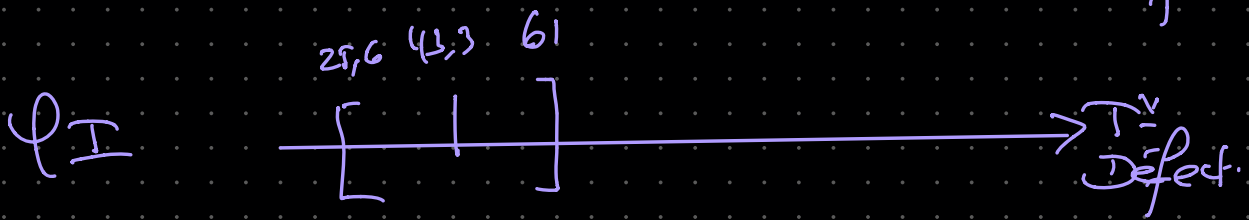
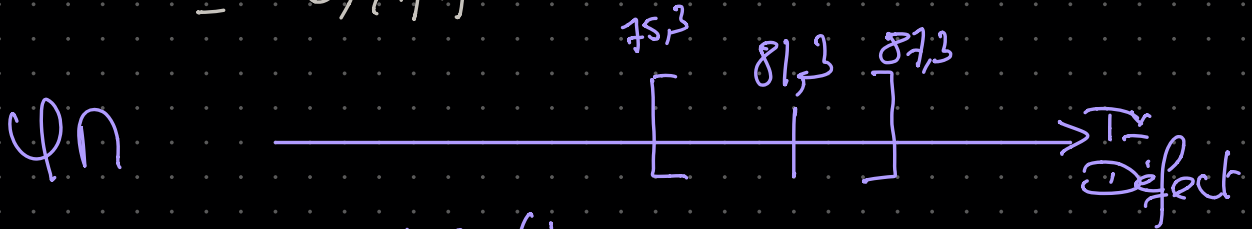
$$= 1,86 \cdot \sqrt{\frac{0,813 \cdot (1-0,813)}{150}} = 0,06$$

ψI 13/30 $n = 30$

43,3 %

$$\Delta = 1,86 \cdot \sqrt{\frac{0,433 \cdot (1 - 0,433)}{30}}$$

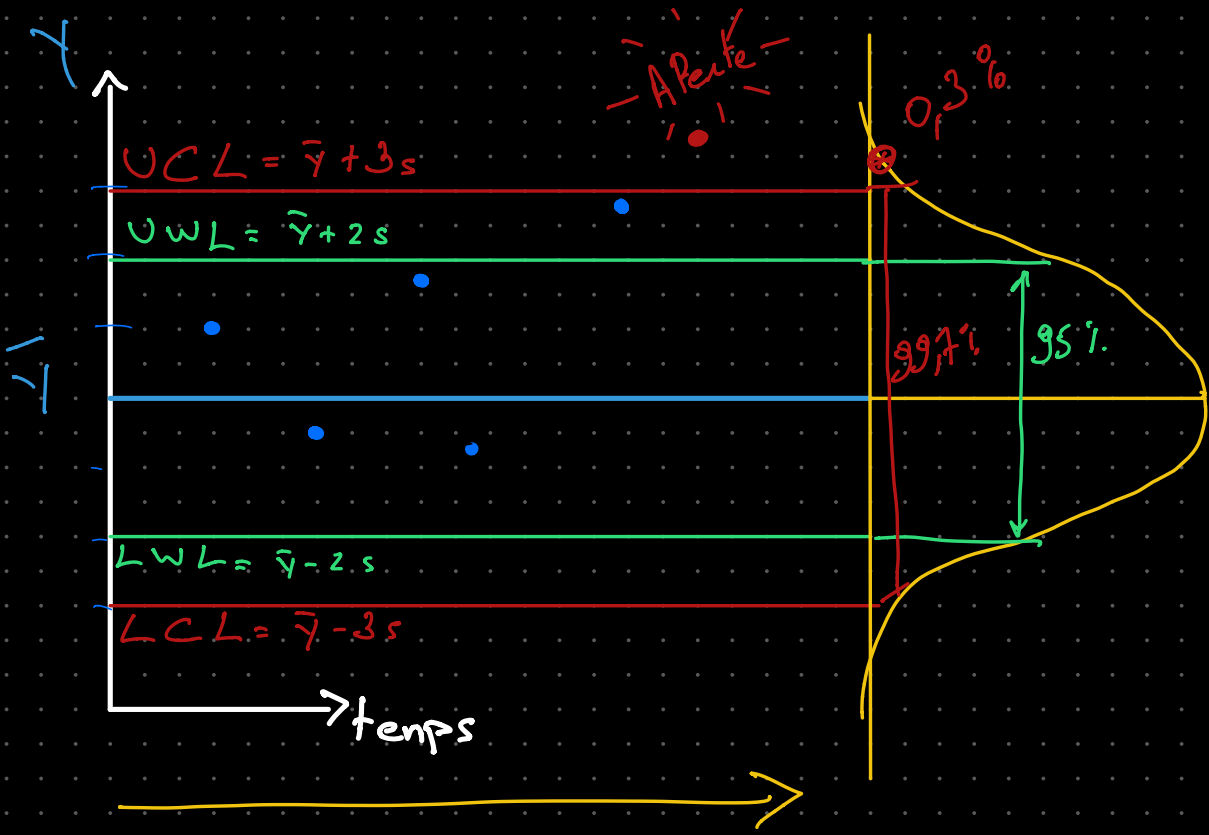
$$= 0,177$$

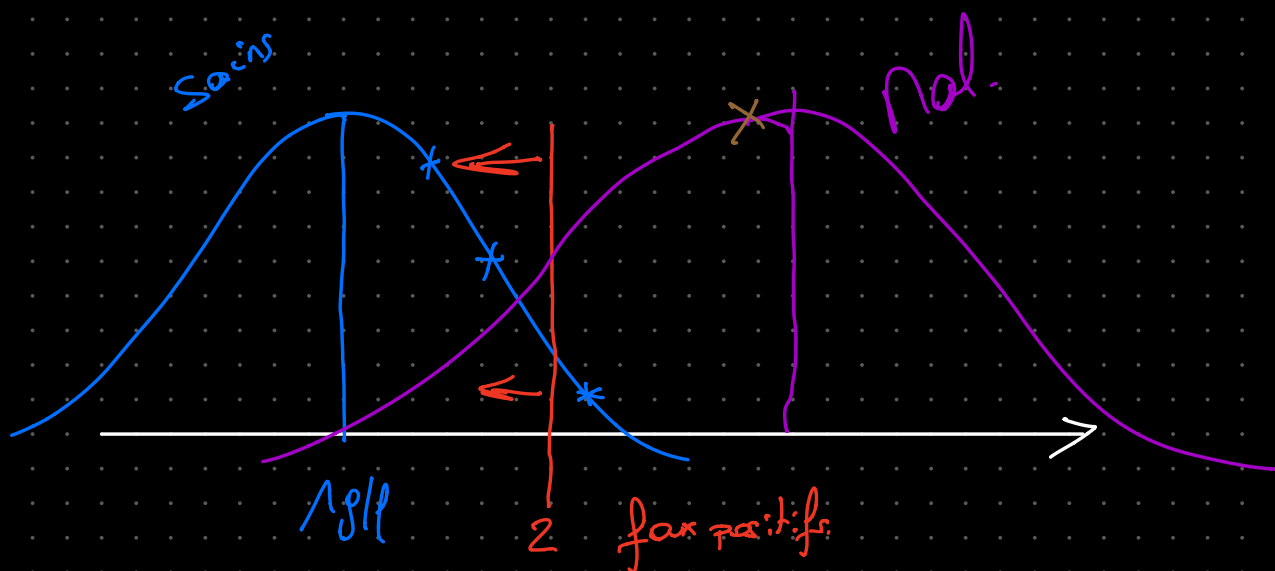


$\left. \begin{matrix} \Delta \\ P \end{matrix} \right\} \textcircled{n}$



13h 15





for Negatif

~~14150~~

Continue

Discrete

		Objets uniques	p nappes Objets	
			$m < 8$	$m \geq 8$
A.T.C.	Individ.	\bar{x}	\bar{x}	
B. Var	Etendue Mobile	R	S	

