Ex 6 Correction

indice	i	1	2	3	4	5	6
cl	$[x_i; x_{i+1}[$	$[0; 0{,}25[$	$[0{,}25; 0{,}5[$	$[0{,}5; 1[$	$[1; 2{,}5[$	$[2{,}5; 5[$	$[5; 10[$
Nb ent	n_i	137	106	112	154	100	33
centre	c_i	0,125	0,375	0,75	1,75	3,75	7,5
freq	f_i	$\frac{137}{642}$	$\frac{106}{642}$	$\frac{112}{642}$	$\frac{154}{642}$	$\frac{100}{642}$	$\frac{33}{642}$
freq cumul ↗	F_i	$\frac{137}{642}$	$\frac{243}{642}$	$\frac{355}{642}$	$\frac{509}{642}$	$\frac{609}{642}$	1
freq cumul ↘	$\tilde{F}_i$	1	$\frac{505}{642}$	$\frac{399}{642}$	$\frac{287}{642}$	$\frac{133}{642}$	$\frac{33}{642}$

On note $x = ([x_i; x_{i+1}[, n_i)_{i=1,\dots,6}$ série statistique

$c_i = \frac{x_i + x_{i+1}}{2}$: centre de la classe $[x_i; x_{i+1}[$

$n = n_1 + \dots + n_6 = 642$

$f_i = \frac{n_i}{n}$

① $\overline{x} = \sum_{i=1}^{6} c_i f_i = 0{,}125 \times \frac{137}{642} + 0{,}375 \times \frac{106}{642} + 0{,}75 \times \frac{112}{642} + 1{,}75 \times \frac{154}{642} + 3{,}75 \times \frac{100}{642} + 7{,}5 \times \frac{33}{642}$

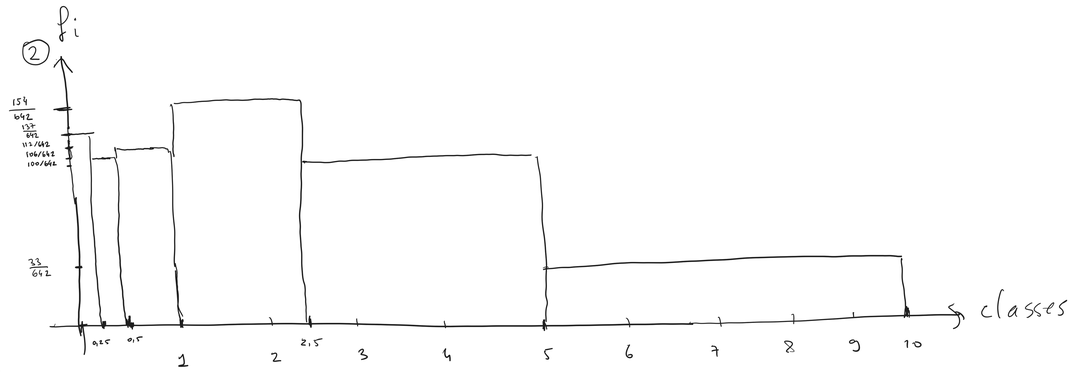
$\overline{x} \simeq 1{,}6088$

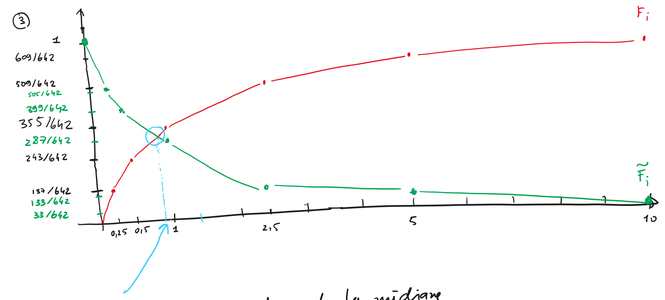
$\sigma_x = \sqrt{V_x}$; $V_x = \overline{x^2} - (\overline{x})^2$

$\overline{x^2} = \sum_{i=1}^{6} c_i^2 f_i = \frac{1}{642}\left(0{,}125^2 \times 137 + 0{,}375^2 \times 106 + 0{,}75^2 \times 112 + 1{,}75^2 \times 154 + 3{,}75^2 \times 100 + 7{,}5^2 \times 33\right)$

$\simeq 5{,}9411$

$V_x \simeq 5{,}9411 - 2{,}5884 \simeq 3{,}3527 \Rightarrow \boxed{\sigma_x \simeq 1{,}831}$

② 

③ 

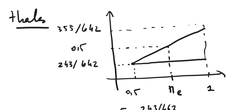
représente une estimation de la médiane.

④ Calcul de la médiane.

$F_2 = \frac{243}{642} < 0{,}5 < \frac{355}{642} = F_3$

Donc la classe médiane est $[0{,}5; 1[$

On note M_e la médiane, $M_e \in [0{,}5; 1[$

Thalès 

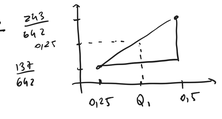
$\frac{M_e - 0{,}5}{1 - 0{,}5} = \frac{0{,}5 - 243/642}{\frac{355}{642} - \frac{243}{642}} \Leftrightarrow \frac{M_e - 0{,}5}{0{,}5} = \frac{642 \times 0{,}5 - 243}{355 - 243}$

$\Leftrightarrow M_e - 0{,}5 = 0{,}5 \times \frac{78}{112} \Leftrightarrow M_e \simeq 0{,}5 + 0{,}3482$

$\boxed{M_e \simeq 0{,}8482}$

Calcul de Q_1

On a $F_1 = \frac{137}{642} < 0{,}25 < \frac{243}{642} = F_2$, donc $Q_1 \in [0{,}25; 0{,}5[$

Thalès 

$\frac{Q_1 - 0{,}25}{0{,}5 - 0{,}25} = \frac{0{,}25 - 137/642}{243/642 - 137/642}$

$\Leftrightarrow Q_1 - 0{,}25 = 0{,}25 \times \frac{0{,}25 \times 642 - 137}{243 - 137}$

$\Leftrightarrow Q_1 = 0{,}25 + 0{,}25 \times \frac{235}{106}$

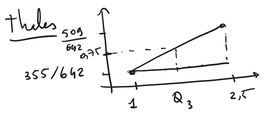
$\boxed{Q_1 \simeq 0{,}3054}$

④ Suite

On a $Q_2 = M_e$

Calcul de Q_3 :

$F_3 = \frac{355}{642} < 0{,}75 < \frac{509}{642} = F_4$, donc $Q_3 \in [1; 2{,}5[$

Thalès 

$\frac{Q_3 - 1}{2{,}5 - 1} = \frac{0{,}75 - 355/642}{509/642 - 355/642}$

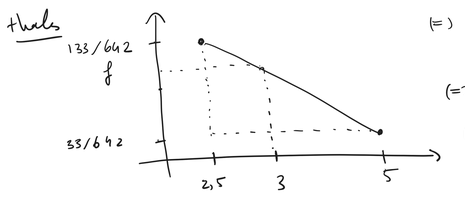
$\Leftrightarrow Q_3 - 1 = 1{,}5 \times \frac{0{,}75 \times 642 - 355}{509 - 355}$

$\Leftrightarrow Q_3 = 1 + 1{,}5 \times \frac{126{,}5}{154} \simeq \boxed{2{,}2321}$

Pour calculer la proportion d'entreprises ~~f~~ gagnant + de 3 M d'€, on utilise les $\tilde{F}_i$: freq cumulés ↘ , puis thalès.

Par ex $\tilde{F}_5 = \frac{133}{642}$ représente la proportion d'entreprises gagnant + de 2,5 M d'€.

On a $3 \in [2{,}5; 5[$

Thalès 

$\frac{f - 33/642}{133/642 - 33/642} = \frac{5 - 3}{5 - 2{,}5}$

$\Leftrightarrow \frac{642 f - 33}{133 - 33} = \frac{2}{2{,}5}$

$\Leftrightarrow 642 f - 33 = 100 \times \frac{2}{2{,}5}$

$\Leftrightarrow 642 f = 33 + 80$

$\Leftrightarrow \boxed{f = \frac{113}{643}}$