Exercice 1 *1)* $n_{23} = 8$, *il y a 8 élèves de taille 170cm et de poids 68kg.*
$n_{32} = 2$, *il y a 2 élèves de taille 175cm et de poids 60kg.*
2) Le nombre d'élèves qui ont un poids inférieur à 60 kg et une taille supérieure à 165cm est $4 + 7 = 11$.
3) Parmi les élèves qui ont une taille de 170cm, le pourcentage de ceux qui pèsent plus de 60kg est $8/50$ *soit* 16%.
4) La distribution des fréquences partielles des couples (X, Y)

X (en cm)/Y (en kg)	y_1=52	y_2=60	y_3=68
x_1=165	f_{11}= 10/50	f_{12}=11/50	f_{13}=3/50
x_2=170	f_{21}=4/50	f_{22} =0	f_{23}=8/50
x_3=175	f_{31}=7/50	f_{32}=2/50	f_{33}=5/50

5) Distribution marginale de X;

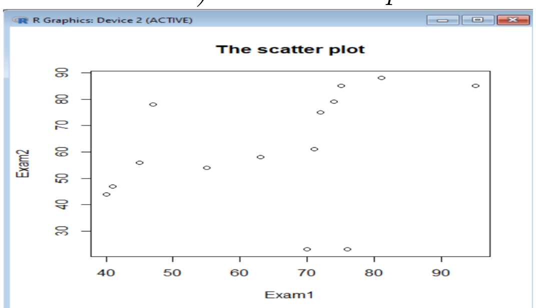
X	$x_1 = 165$	$x_2 = 170$	$x_3 = 175$
$f_{i.}$	24/50	12/50	14/50

$\bar{x} = 165 * (24/50) + 170 * (12/50) + 175 * (14/50) = 169.$
$Var(X) = 165^2 * (24/50) + 170^2 * (12/50) + 175^2 * (14/50) - 169^2 = 18.$
$\sigma_x = 4.24.$
Distribution marginale de Y;

Y	$y_1 = 52$	$y_2 = 60$	$y_3 = 68$
$f_{.j}$	21/50	13/50	16/50

6)$\bar{y} = 52 * (21/50) + 60 * (13/50) + 68 * (16/50) = 59.2.$
$Var(Y) = 52^2 * (21/50) + 60^2 * (13/50) + 68^2 * (16/50) - 59.2^2 = 46.72.$
$\sigma_y = 6.84.$
7)$f_{3|2} = \frac{n_{32}}{n_{2.}} = 8/12,$ *soit* 66.67%.
8)$Cov(X, Y) = 165 * (52 * 10/50 + 60 * 11/50 + 68 * 3/50) + 170 * (52 * 4/50 + 0 * 60 + 68 * 8/50) + 175 * (52 * 7/50 + 60 * 2/50 + 68 * 5/50) - 169 * 59.2$
$= 10008 - 10004.8 = 3.2.$
9)$r = \frac{3.2}{4.24*6.84} = 0.1103$

Exercice 2 *1) The scatter plot*

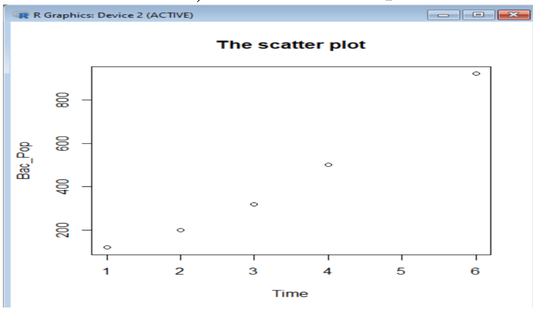


Notice that there are two outliers 23,23 for exam2 (les valeurs aberrantes; des valeurs qui s'éloignent du nuage des points).
2)$\bar{x} = 64.64,\ \bar{y} = 61.14.$
3) $\sum x = 905,\ \sum y = 856,\ \sum xy = 57010;$
$cov(Exam1, Exam2) = \frac{1}{14} \times 57010 - 64.64 \times 61.14 = 120.05.$
4) $\sum x^2 = 62097,\ \sum y^2 = 58484. Var(x) = \frac{62097}{14} - 64.64^2 = 257.17.$
$Var(y) = \frac{58484}{14} - 61.14^2 = 439.329.$

$r = \frac{120.05}{\sqrt{257.17} \times \sqrt{439.329}} = 0.3571.$
5) the equation $y = \frac{120.05}{257.17}x + (61.14 - \frac{120.05}{257.17} * 64.64) = 0.467x + 30.953$

Exercice 3 *1) No data values have both x and y greater than their respective means or both less than them. Given that r is negative (negative correlation) x and y vary in opposite directions.*
2) $R_x = 14 - 7.1 = 6.9,\ R_y = 10.5 - (-3) = 13.5.$

Exercice 4 *1) The scatter plot*



2) $y = ae^{bx} \Rightarrow \ln y = \ln a + bx$, *let denote* $z = \ln y$ *and* $\alpha = \ln a$, *then we have* $z = \alpha + bx$.
Values of z; 4.787, 5.298, 5.768, 6.215, 6.824.
$\sum z = 28.892,\ \sum Time = 16,\ \sum Time^2 = 66,\ \sum Time \times z = 98.491.$
$b = \frac{(1/5)*98.491-(1/5)^2*28.892*16}{(1/5)*66-(1/5)^2*16^2} = 0.408.$
$\alpha = \frac{28.892}{5} - 0.408 * \frac{16}{5} = 4.473,\ a = \exp\alpha = 87.619.$
3. The final equation of the model is $y = 87.619\exp(0.408x)$.
4. $y_{5h} = 87.619\exp(0.408 \times 5) = 673.8435.$

Exercice 5 *1) Indep Variable X: Year, Depend Variable Y: Distance.*
2) A strong positive relation ship, there is only a small amount of scatter in the plot.
3) $\sum(Year) = 48800,\ \sum(Year^2) = 95285440,\ \sum(Year * Distance) = 390239.3,\ \sum(Distance) = 199.67,\ \sum(Distance^2) = 1604.766.$
$r = \frac{(390239.3/25)-\left(48800*199.67/25^2\right)}{\left(\left((95285440/25)-(48800/25)^2\right)*\left((1604.766/25)-(199.67/25)^2\right)\right)^{0.5}} = 0.9144.$
4.To determine the linear equation $y = a + bx$;
$b = \frac{(390239.3/25)-\left(48800*199.67/25^2\right)}{(95285440/25)-(48800/25)^2} = 0.0174.$
$a = 199.67/25 - 0.0174 * 48800/25 = -25.978$, *then;*
$y = -25.978 + 0.0174 * x$;
5. $y_{2008} = 8.96m$,