2023-2024

corrigé de l'examen final du Module statistique et Informatique 1ère Année Master Physique Médicale

Exercice n° 1

1/

x_i \ y_j	1	2	3	4	$n_{i.}$
1	1	3	4	2	10
2	7	1	5	3	16
3	9	5	6	4	24
$n_{.j}$	17	9	15	9	50

1

2/ $\bar{x} = \dfrac{1\times 10 + 2\times 16 + 3\times 24}{50} = 2{,}28$ 0,5

$\overline{x^2} = \dfrac{1^2\times 10 + 2^2\times 16 + 3^2\times 24}{50} = 5{,}8$ 0,5

$V(x) = \overline{x^2} - (\bar{x})^2 = 5{,}8 - (2{,}28)^2 = 0{,}6016.$ 0,5

$\sigma(x) = \sqrt{V(x)} = \sqrt{0{,}6016} \simeq 0{,}7756$

$\sigma(x) \simeq 0{,}78$ 0,5

3/ $\bar{y} = \dfrac{1\times 17 + 2\times 9 + 3\times 15 + 4\times 9}{50} = 2{,}32$ 0,5

$$\overline{y^2} = \frac{1^2 \times 17 + 2^2 \times 9 + 3^2 \times 15 + 4^2 \times 9}{50} = 6{,}64$$ 0,5

$$V(y) = \overline{y^2} - (\overline{y})^2 = 6{,}64 - (2{,}32)^2 = 1{,}2576$$ 0,5

$$\sigma(y) = \sqrt{V(y)} = \sqrt{1{,}2576} \simeq 1{,}12$$ 0,5

4/ $$\overline{xy} = \frac{1\times1\times1 + 1\times2\times3 + 1\times3\times4 + 1\times4\times2}{50}$$

$$+ \frac{2\times1\times7 + 2\times2\times1 + 2\times3\times5 + 2\times4\times3 + 3\times1\times9}{50}$$

$$+ \frac{3\times2\times5 + 3\times3\times6 + 3\times4\times4}{50}$$

$$\overline{xy} = \frac{258}{50} = 5{,}16.$$ 1

$$\mathrm{cov}(x,y) = \overline{xy} - \overline{x}\,\overline{y} = 5{,}16 - 2{,}28 \times 2{,}32$$

$$\mathrm{cov}(x,y) = -0{,}1296.$$ 1

$$r(x,y) = \frac{-0{,}1296}{0{,}78 \times 1{,}12} \simeq -0{,}1483$$

$$r(x,y) \simeq -0{,}15$$ 1

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Exercice 2 : (12 points)

2/ $\bar{x} = 3$ $\overline{x^2} = 11$ $V(x) = 2$ 2 $\sigma(x) \simeq 1,41$

3/ $\bar{y} = 9$ $\overline{y^2} = 89,425$ $V(y) = 8,425$ $\sigma(y) \simeq 2,9$. 2

4/ $\overline{xy} = 31,1$ 1 $cov(x,y) = 4,1$ 1

$$r(x,y) = \frac{4,1}{\sqrt{2} \times \sqrt{8,425}} = 0,9988$$ 1

5/ $(\Delta) : y = ax + b$

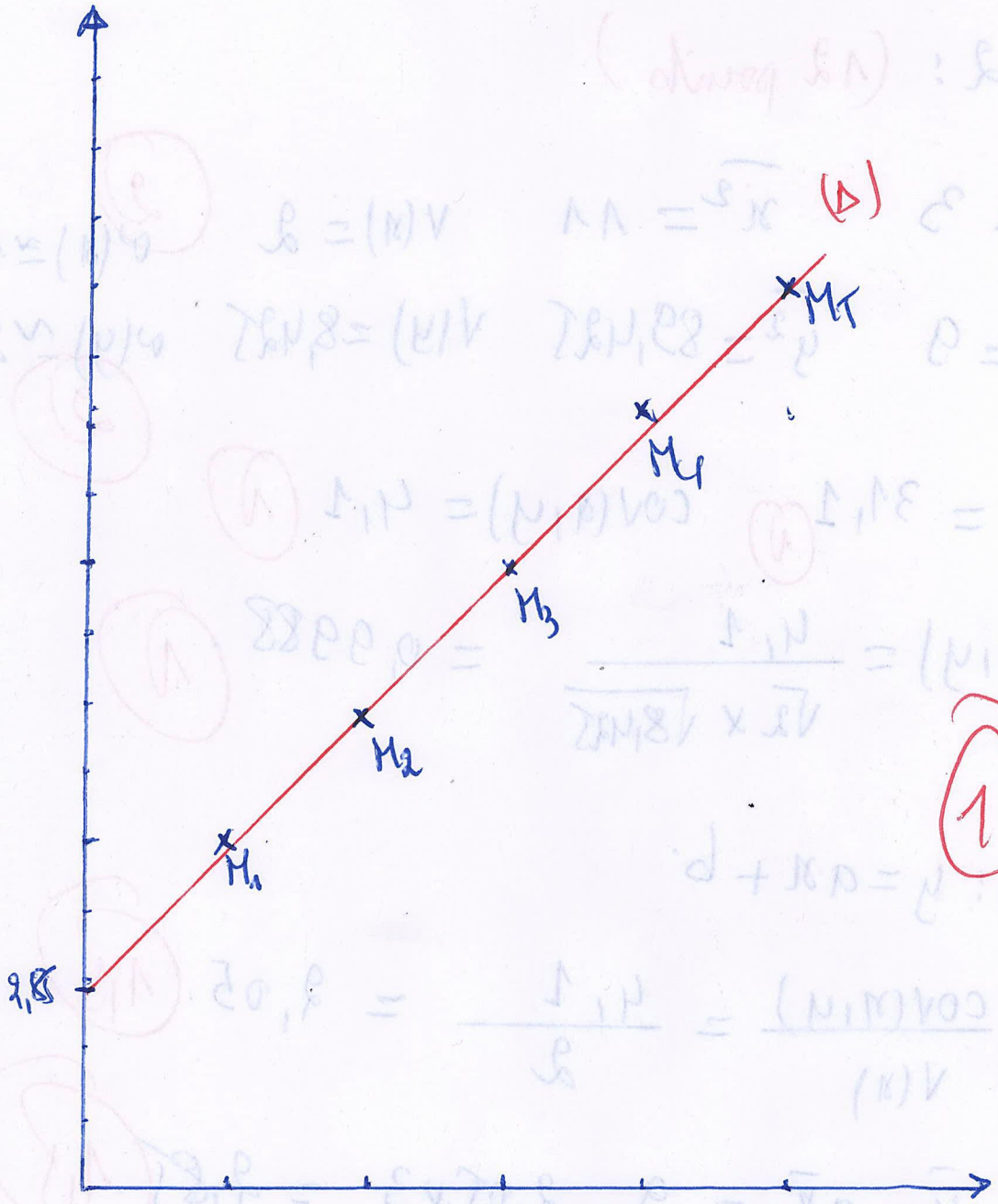
$$a = \frac{cov(x,y)}{V(x)} = \frac{4,1}{2} = 2,05.$$ 1,5

$$b = \bar{y} - a\bar{x} = 9 - 2,05 \times 3 = 2,85$$ 1,5

6/ pour $x = 3,5$ on trouve $y = 2,05 \times 3,5 + 2,85$

donc $y = 10,025$. 1

3/



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