

2023-2024

corrigé de l'examen final

du Module statistique et Informatique
1^{re} Année Master Physique Médicale

Exercice n° 1

1/

$x_i \backslash y_j$	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

$$2/ \bar{x} = \frac{1 \times 10 + 2 \times 16 + 3 \times 24}{50} = 2,28 \quad \text{①}$$

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

$$V(x) = \overline{x^2} - (\bar{x})^2 = 5,8 - (2,28)^2 = 0,6016 \quad \text{①}$$

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

$$\sigma(x) \approx 0,78 \quad \text{①}$$

$$3/ \bar{y} = \frac{1 \times 17 + 2 \times 9 + 3 \times 15 + 4 \times 9}{50} = 2,32 \quad \text{①}$$

$$\bar{y^2} = \frac{1^2 \times 17 + 2^2 \times 9 + 3^2 \times 15 + 4^2 \times 9}{50} = 6,64 \quad (0,1)$$

$$v(y) = \bar{y^2} - (\bar{y})^2 = 6,64 - (2,32)^2 = 1,2576 \quad (0,1)$$

$$\sigma(y) = \sqrt{v(y)} = \sqrt{1,2576} \approx 1,12 \quad (0,1)$$

$$4/ \quad \bar{xy} = \frac{1 \times 1 \times 1 + 1 \times 2 \times 3 + 1 \times 3 \times 4 + 1 \times 4 \times 2}{50}$$

$$+ \frac{2 \times 1 \times 7 + 2 \times 2 \times 1 + 2 \times 3 \times 5 + 2 \times 4 \times 3 + 3 \times 1 \times 9}{50}$$

$$+ \frac{3 \times 2 \times 5 + 3 \times 3 \times 6 + 3 \times 4 \times 4}{50}$$

$$\bar{xy} = \frac{258}{50} = 5,16 \quad (1)$$

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

$$\text{cov}(x, y) = -0,1296 \quad (1)$$

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

$$r(x, y) \approx -0,15 \quad (1)$$

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statistique et Informatique 1 Master Phy Médicale
(suite)

exercice 2: (12 points)

2 | $\bar{x} = 3$ $\bar{x}^2 = 11$ $V(x) = 2$ $\sigma(x) \approx 1,41$

3 | $\bar{y} = 9$ $\bar{y}^2 = 89,425$ $V(y) = 8,425$ $\sigma(y) \approx 2,9$

4 | $\bar{xy} = 31,1$ $\text{cov}(x, y) = 4,1$

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

5 | (a) : $y = ax + b$

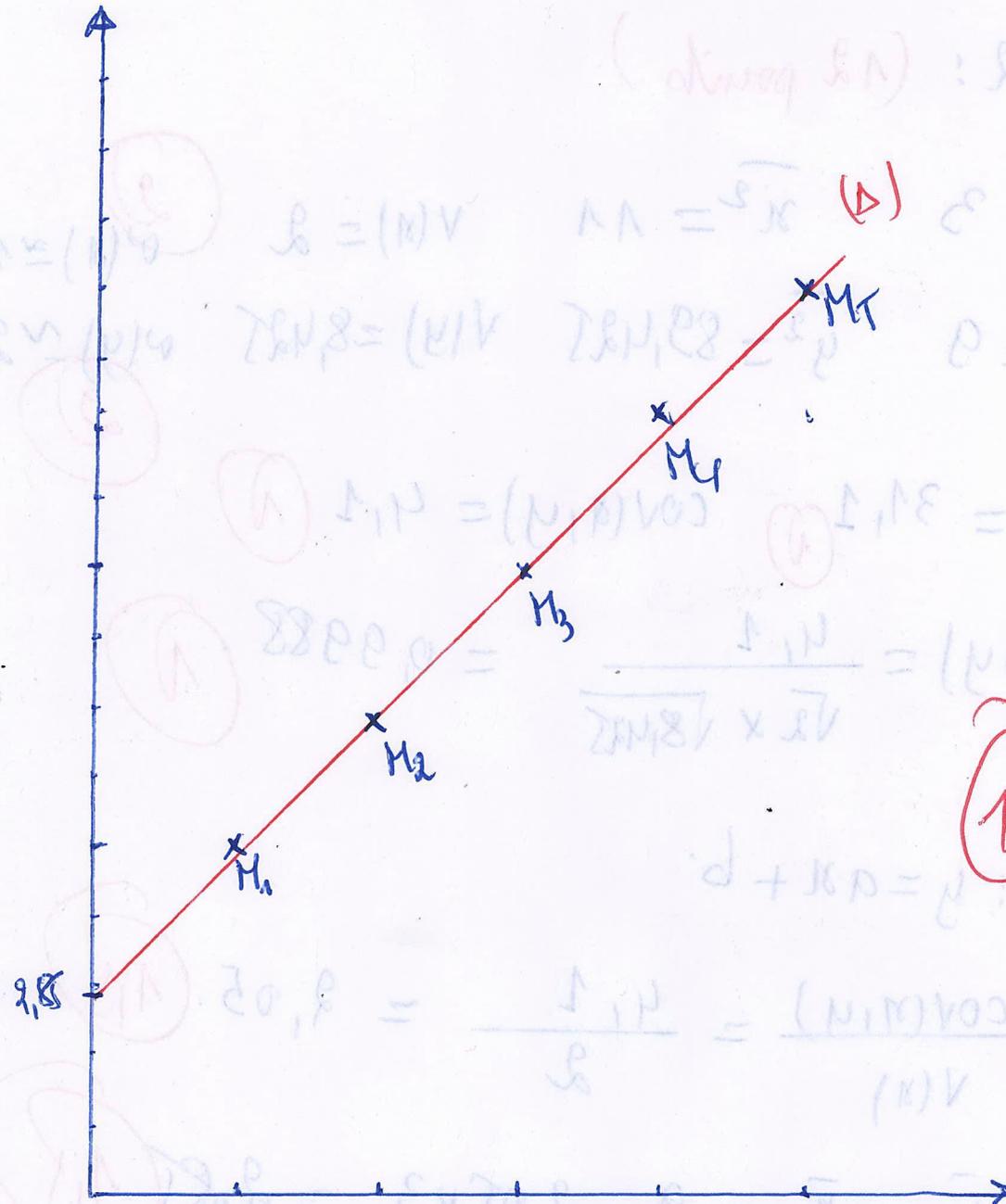
$a = \frac{\text{cov}(x, y)}{V(x)} = \frac{4,1}{2} = 2,05$

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

6 | pour $x = 3,5$ on trouve $y = 2,05 \times 3,5 + 2,85$
donc $y = 10,025$

Handwritten text at the top of the page, partially obscured and difficult to read. It appears to be a title or introductory note.

2/



Formulas and notes in the upper right quadrant, including a circled '1'.

Mathematical formulas: $\sigma = \sqrt{x}$, $\sigma = \bar{x}$, $\sigma = \bar{y}$.

Mathematical formulas: $\Delta N = (N, N)$, $\Delta N = \bar{x}$.

Mathematical formulas: $r(N) = \frac{\Delta N}{\sqrt{\Delta N \times \Delta N}}$.

1

Mathematical formulas: $\Delta N = \Delta x + \Delta y$.

Mathematical formulas: $\Delta = \frac{\text{COV}(N)}{\sigma}$.

Mathematical formulas: $\Delta = \Delta x + \Delta y$.

Mathematical formulas: $\Delta = 10,052$.