

ملاحظة: - يسمح باستعمال آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البيانات.
- يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الواردة في المسابقة).

مسابقة في مادة الرياضيات

المدّة: ساعة

(انكليزي)

الاسم:

الرقم:

I- (5 points)

1) **Solve** the following system:

$$\begin{cases} 3x + 2y = 6500 \\ 2x + 3y = 6000 \end{cases}$$

2) Nabil and Sami buy croissants from the same bakery.

- Nabil **paid 65 000 LL** for:
 - ✓ 30 chocolate croissants
 - ✓ 20 cheese croissants.
- Sami **paid 60 000 LL** for:
 - ✓ 20 chocolate croissants
 - ✓ 30 cheese croissants.

- a- **Write** a system of two equations with two unknowns modeling the given situation.
- b- **Calculate** the price of a chocolate croissant **and** the price of one cheese croissant.
- c- The bakery **offers a 20% discount** on the price of the chocolate croissants only.

Nabil has **100 000 LL**.

- i. **Verify that** the price of one chocolate croissant during this discount is **1200 LL**.
- ii. Can Nabil buy 50 chocolate croissants and 45 cheese croissants? **Justify**.

II- (5 points)

A survey is done on a population of **70 men** and **30 women** about their **preferred mean of transportation**.

The person should select only one mean of transportation among: car, bike or bus.

The results are shown in the following table:

	Car	Bike	Bus	Total
Men	35	10		70
Women	15		10	
Total		15		100

- 1) **Copy and complete** the table above.
- 2) A person is selected randomly from this population.

Consider the following events:

- C: "The selected person prefers the car"
- B: "The selected person prefers the bike"
- M: "The selected person is a man"

a- **Determine** the following probabilities:

- $P(M)$
- $P(C \cap M)$
- $P(\bar{C} \cap \bar{B})$

b- **Verify that** $P(B \cup M) = \frac{3}{4}$

c- The selected person prefers the car.

Calculate the probability that this person is a woman.

III- (10 points)

Consider the function f defined over $]-\infty; -1[\cup]-1; +\infty[$ as:

$$f(x) = \frac{2x^2 + 5x + 2}{x + 1}$$

Denote by (C) the representative curve of f in an orthonormal system $(O; \vec{i}, \vec{j})$.

1) **Determine** $\lim_{\substack{x \rightarrow -1 \\ x < -1}} f(x)$ and $\lim_{\substack{x \rightarrow -1 \\ x > -1}} f(x)$.

2) **Deduce** an equation of an asymptote (d) to (C).

3) a- **Determine** $\lim_{x \rightarrow -\infty} f(x)$ and $\lim_{x \rightarrow +\infty} f(x)$.

b- **Verify that** $f(x) = 2x + 3 - \frac{1}{x + 1}$.

d- **Show that** the line (D) with equation:

$$y = 2x + 3 \text{ is an asymptote to (C).}$$

4) **Calculate** $f'(x)$.

5) **Verify** that $f'(x) > 0$.

6) **Complete** the table of variations of f .

x	$-\infty$	-1	$+\infty$
f'			
f			

7) a- **Copy and complete** the following table:

x	-3	-1.5	0	1
f(x)	-2.5			

b- **Determine** the abscissas of the two points of intersection of (C) and the x-axis.

c- **Draw** (d), (D), and (C).

d- **Solve graphically:** $f(x) < 2$.