

عدد المسائل: ثلاث	مسابقة في مادة الرياضيات المدة: ساعة واحدة	الاسم: الرقم:
-------------------	---	------------------

ملاحظة: يُسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو إختزان المعلومات أو رسم البيانات.
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الإلتزام بترتيب المسائل الوارد في المسابقة).

I- (5 points)

The following table represents the distribution of 100 persons according to their blood groups:

Blood Group	O	A	B	AB
Rhesus +	32	40	6	2
Rhesus -	7	6	2	5

One person, out of these 100, is randomly chosen then interviewed .

- 1) What is the probability that the person interviewed is of negative Rhesus?
- 2) Consider the following events :
A : « The person interviewed has a blood group A ».
E : « The person interviewed has a blood group of positive Rhesus ».
Calculate the probability P (A/E).
- 3) The person interviewed is of blood group B, what is the probability that this person is of positive Rhesus ?
- 4) In this question, two persons are randomly chosen, one after another, and asked about their blood groups. Calculate the probability that the two chosen persons are of blood group O.

II- (5 points)

The following table represents the number of kilograms of apples, oranges and bananas bought by three friends, and the total amount in LL paid by each of them.

	Number of kilograms of apples	Number of kilograms of oranges	Number of kilograms of bananas	Total amount paid in LL
Samia	2	1	3	12 500
Nadim	1	2	0	7 000
Salim	0	2	4	10 000

- 1) Calculate the price of one kg of apples, one kg of oranges and that of one kg of bananas.
- 2) Salim decides, also, to buy two kg of apples, and Nadim decides , also, to buy some kg of bananas.
How many kg of bananas should Nadim buy so that he will pay the same total amount as Salim?

III- (10 points)

Consider the function f defined over $] -\infty ; -2[\cup] -2 ; +\infty [$ by $f(x) = ax + b + \frac{2}{x+2}$ where a and b are two real numbers ($a \neq 0$). Denote by (C) its representative curve in an orthonormal system $(O; \vec{i}, \vec{j})$.

The table of variations of f is the following:

x	$-\infty$	-2	$+\infty$
$f(x)$	$+\infty$	$+\infty$	$+\infty$
	↘		↘
	$-\infty$		$-\infty$

A-

- 1) Compare, with justification, $f(-4)$ and $f(-3)$.
- 2) What is the number of solutions of the equation $f(x) = -2$?
- 3) Knowing that $f(-3) = 0$ and that $f(0) = 0$, calculate a and b .

B-

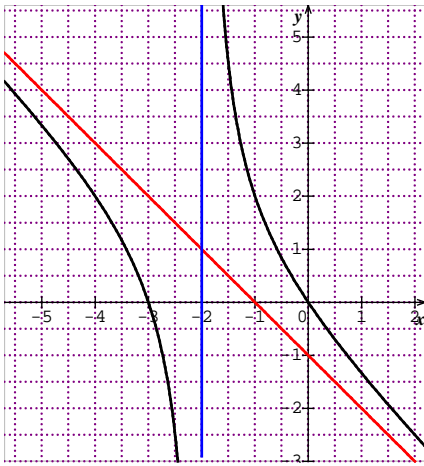
In this part, suppose that $f(x) = -x - 1 + \frac{2}{x+2}$.

- 1) Verify that the line (Δ) with equation $x = -2$ and the line (D) with equation $y = -x - 1$ are asymptotes to (C) .
- 2) Draw (Δ) , (D) and (C) .
- 3) a- The line (d) with equation $y = x$ intersects the curve (C) in two distinct points. Calculate the coordinates of these points and draw (d) in the same system $(O; \vec{i}, \vec{j})$.
- b- Using (C) and (d) , solve the following inequality :

$$-x - 1 + \frac{2}{x+2} \geq x.$$

I	Answers	Mark
1	$P(R_{-}) = \frac{7+6+2+5}{100} = \frac{20}{100} = 0.2.$	1
2	$P(A/E) = \frac{40}{32+40+6+2} = \frac{40}{80} = \frac{1}{2} = 0.5.$	1
3	$P(E/B) = \frac{6}{8} = \frac{3}{4} = 0.75.$	1.5
4	$P(\text{both are of blood group O}) = \frac{39}{100} \times \frac{38}{99} = \frac{247}{1650}$	1.5

II	Answers	Mark
1	<p>x is the price of 1 kg of apples ; y is the price of 1 kg of oranges. z is the price of 1 kg of bananas.</p> $\begin{cases} 2x + y + 3z = 12500 \\ x + 2y = 7000 & ; \quad x = 3000 & ; \quad y = 2000 & ; \quad z = 1500 \\ 2y + 4z = 10000 \end{cases}$	3
2	$2 \times 3000 + 10000 = b \times 1500 + 7000 ; 1500b = 9000 ; b = 6$ Hence , Nadim must buy 6 kg of bananas.	2

II	Answers	Mark
A1	-3 and -4 belong both to $]-\infty ; -2[$ over which f is continuous and strictly decreasing ; hence $f(-3) < f(-4)$.	1
A2	The number of solutions of $f(x) = -2$ is 2.	1
A3	Since $f(0) = 0$ then $b+1=0$ and $b = -1$. Since $f(-3) = 0$ then $-3a+b=2$ and $a = -1$.	2
B1	$\lim_{x \rightarrow +\infty} (f(x) - y) = \lim_{x \rightarrow +\infty} \frac{2}{x+2} = 0 ; \quad \lim_{x \rightarrow -\infty} (f(x) - y) = \lim_{x \rightarrow -\infty} \frac{2}{x+2} = 0 .$ <p>Hence the line with equation $y = -x - 1$ is an asymptote to (C).</p> $\lim_{x \rightarrow -2} f(x) = +\infty, \lim_{x \rightarrow -2} f(x) = -\infty \text{ (from the table), hence the line } (\Delta) \text{ with equation}$ $x = -2 \text{ is an asymptote to (C).}$	1
B2		2
B3a	$-x - 1 + \frac{2}{x+2} = x ; 2x^2 + 5x = 0 \quad x = \frac{-5}{2} \text{ or } x = 0 ;$ hence (C) cuts (d) at $A(\frac{-5}{2}, \frac{-5}{2})$ and $O(0,0)$.	1.5
B3b	The inequality corresponds to the region where (C) is above (d) or (C) cuts (d) and this is true for: $x \leq \frac{-5}{2}$ or $-2 < x \leq 0$.	1.5