

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

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).

I- (5 points)

Rami and Bassem are two clients of the same store.

One day, Rami bought 3 shirts and 2 ties and paid 130 000 LL.

While Bassem bought 2 shirts and 3 ties and paid 120 000 LL.

- 1) Calculate the price of one shirt and the price of one tie.
- 2) During a sale period, the store offers a 20% discount on the price of each shirt.
 - a) What is the price of one shirt after this discount?
 - b) Rami went to the store during the sale period and bought 5 shirts and n ties.
Calculate n knowing that he paid 200 000 LL.

II- (5 points)

A survey is done on a population formed of 40 men and 60 women about their usage of three kinds of soaps A, B and C. The results are shown in the following table:

	Soap A	Soap B	Soap C
Men	20	5	15
Women	15	20	25

A person is randomly selected from this population and interviewed :

Consider the following events :

A : « The interviewed person uses soap A »

B : « The interviewed person uses soap B »

M : « The interviewed person is a man ».

- 1) Calculate the following probabilities:

$P(M)$; $P(A \cap M)$; $P(A / M)$; $P(B \cup M)$ and $P(\bar{B})$.

- 2) The interviewed person doesn't use soap A. Calculate the probability that this person is a man.

III- (10 points)

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

$$f(x) = \frac{4x^2 - x + 1}{x - 1}$$

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

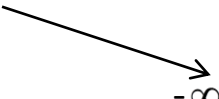
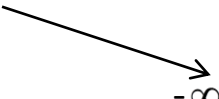
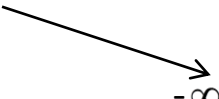
- 1) Determine $\lim_{\substack{x \rightarrow 1 \\ x < 1}} f(x)$ and deduce an equation of an asymptote (d) to (C).
- 2) a) $f(x)$ can be written in the form $f(x) = 4x + 3 + \frac{m}{x-1}$. Calculate the real number m .
 b) Determine $\lim_{x \rightarrow -\infty} f(x)$.
 c) Show that the line (D): $y = 4x + 3$ is an asymptote to (C).
- 3) Prove that, for all x in $] - \infty; 1[$: $f'(x) = \frac{4x(x-2)}{(x-1)^2}$.
- 4) Copy and complete the following table of variations of f .

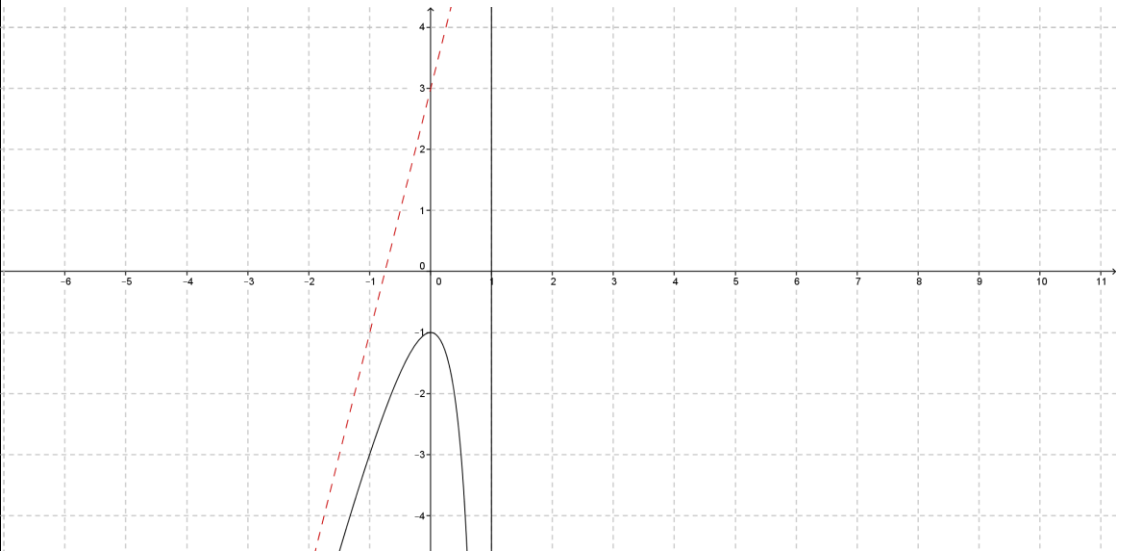
x	$-\infty$	0	1
$f'(x)$		$\bigcirc$	
$f(x)$			

- 5) Write an equation of the tangent (T) to (C) at the point with abscissa -1.
- 6) Draw (d), (D) and the curve (C).
- 7) Solve graphically: $f(x) \leq -1$.
- 8) Solve the equation: $f(x) = 4x$.

QI	Answer Key	Note
1	the price of a shirt is $x = 30000$ L.L the price of a tie $y = 20000$ L.L	2
2a	The price of a shirt after the sold is $3000(1 - 0.2) = 24000$ L.L	$1\frac{1}{2}$
2b	$5(24000) + 20000n = 20000$ then $n = 4$	$1\frac{1}{2}$

QII	Answer Key	Note
1	$P(H) = \frac{40}{100} = 0.4$; $P(A \cap H) = 0.2$; $P(A/H) = \frac{20}{40} = 0.5$ $P(B \cup H) = \frac{15+20+25+5}{100} = 0.65$ and $P(\bar{B}) = 0.75$	4
2	$P(H/\bar{A}) = \frac{20}{65}$	1

QIII	Answer Key	Note												
1a	$\lim_{\substack{x \rightarrow 1 \\ x < 1}} f(x) = -\infty$ (d) : $x = 1$	1												
2a	$f(x) = 4x + 3 + \frac{m}{x-1} = \frac{4x^2 - x + 1}{x-1}$ then $-3 + m = 1$ therefore $m = 4$	1												
2b	$\lim_{x \rightarrow -\infty} f(x) = -\infty$	$1/2$												
2c	$\lim_{x \rightarrow -\infty} [f(x) - y_d] = 0$	$1/2$												
3	$f'(x) = \frac{4x(x-2)}{(x-1)^2}$	1												
4	<table><tr><td>x</td><td>$-\infty$</td><td>0</td><td>1</td></tr><tr><td>f'(x)</td><td>+</td><td></td><td>-</td></tr><tr><td>f(x)</td><td></td><td>-1</td><td></td></tr></table>	x	$-\infty$	0	1	f'(x)	+		-	f(x)		-1		$1\frac{1}{2}$
x	$-\infty$	0	1											
f'(x)	+		-											
f(x)		-1												
5	$f(-1) = -3$ and $f'(-1) = 3$ the equation of the tangent (T) : $y = 3x$	1												

6		$1\frac{1}{2}$
7	$x \in]-\infty ; 1[$	1
8	$f(x) = 4x = \frac{4x^2 - x + 1}{x - 1}$ $x = -\frac{1}{3}$	1