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<u>Exercice 1</u> (2 points)

In the following table, only one answer to each question is correct. Write the number of each question with its answer and write a **<u>justification</u>**.

N°	Questions	Réponses		
		a	b	c
1)	let f be the function defined by f(x) = ln(1 – lnx) the domain of definition of f is :	$]0\,;+\infty[$	$]0\,;e]$	$]0\,;e[$
2)	let $F(x) = \int_0^{2x} \frac{1}{\sqrt{t^2+1}}\,dt$ defined over IR then F(x)	Is increasing	Is decreasing	Is not monotone
3)	Let g be a function defined for all real number x and $g(4-x)+g(x)=10$. Then the curve of g has center of symmetry the point…	(4 ; 5)	(2 ; 10)	(2 ; 5)
4)	Given the following table of variation of a continuous function h that is defined over IR. x: $-\infty$ -1 $+\infty$ $h(x)$: -3 ↘ -5 ↗ $+\infty$ The equation $h(x)=1$ has ….	One solution	Two solutions	no solutions

<u>Exercice 2</u> (5 points)

The complex plane is attached to a direct orthonormal system $(O;\vec{u};\vec{v})$

Given the points A, B and M of affixes: $z_A = 2i$, $z_B = \sqrt{3} - i$, $z_M = 2ie^{i\theta}$, $\theta \in]0;2\pi[$

1) In this part suppose that $\theta = \frac{2\pi}{3}$

   a) Find the exponential form of z_B and z_M

   b) Verify that $\frac{z_M - z_A}{z_B - z_A} = \frac{1}{2} - i\frac{\sqrt{3}}{2}$. Deduce the exact nature of triangle ABM

2) let M' be a point of the plane such that $z_{M'} = \frac{2iz_M - 4}{z_M}$

   a) Interpret geometrically $|z_{M'} - 2i|$ and verify that $|z| = 2$.

   b) Show that AM′ × OM = 4 then deduce that if $\theta \in]0;2\pi[$, the point M' varies over a circle (C), whose center and radius are to be determined.

Exercise IV (8 points)

Consider the two functions f and g that are defined on]0 ;+∞ [by: $f(x)=(x-1)(\ln(x)-1)$ and $g(x)=\ln(x)-\frac{1}{x}$. Designate by (C) the representative curve of f in an orthonormal system.(unit:2cm)

1) a) Find $\lim_{x\to o^+} g(x)$ and $\lim_{x\to+\infty} g(x)$.

   b) Calculate $g'(x)$, then Setup the table of variation of g over] 0 ;+∞[.

   c) Show that the equation g(x)=0 has a unique solution α . Verify that 1.75 < α <1.77 .

2) a) Calculate $\lim_{x\to o^+} f(x)$ and $\lim_{x\to+\infty} f(x)$. Deduce an asymptote to (C).

   b) Show that $f'(x)=g(x)$, then deduce that f is decreasing over $]0;\alpha[$ and increasing ove $]\alpha;+\infty[$.

   c) Setup the table of variation of f.(take $\alpha=1.76$)

   d) Calculate f(1) and f(e). Draw (C)

3) a) Show that the function F defined on]0 ;+∞ [by $F(x)=\left(\frac{1}{2}x^2-x\right)\ln x-\frac{3}{4}x^2+2x$, is an antiderivative of f over]0 ;+∞ [.

   b) Deduce the exact value of the area of the region of the plane bounded by (C) , $x'Ox$, and the vertical lines of equations x=1 and x=e.

<u>Exercice 3</u> (5 points)

Consider 2 urns U and V such that :

U contains 3 red balls and 2 white balls ; V contains 2 red balls and 3 white balls , we randomly draw one ball from U and put it in V , then we randomly draw 2 balls from V . Consider the following events:

R :"the drawn ball from U is red’’ .

B :’’ the drawn ball from U is white’’ .

A :’’the 2 balls drawn from V are red ’’.

C :’’ the 2 balls drawn from V are white’’.

1) Show that $P(A\cap R)=0.3$ and calculate $P(A\cap B)$, deduce $P(A)$.
2) Calculate P(C).
3) The drawn ball from U is white, calculate the probability of obtaining 1 red ball and 1 white ball from V.
4) Let X be the random variable equals to the number of red balls drawn from V.
   a) Show that $P(X=0)=0.28$.
   b) Determine the probability distribution of X.
   c) Calculate E(X).