

Exercise 1	Calc. : ✗
<p>Let f be the function defined on $(0, +\infty)$ by $f(x) = a + b \frac{\ln(x)}{x}$.</p> <p>The representative curve of the function f admits an asymptote horizontal with equation $y = 1$ and a tangent at the point of abscissa 1 with equation $y = -x + 2$.</p> <p>Determine the values of a and b.</p>	5 marks

Exercise 2	Calc. : ✗
<p>In a three-dimensional space, we consider:</p> <ul style="list-style-type: none"> • The line L_1 of parametric representation: $\begin{cases} x = 3 + \lambda \\ y = -3 - 4\lambda \\ z = -2 + 2\lambda \end{cases} \quad (\lambda \in \mathbb{R})$ • The point $A(2, 1, -4) \in L_1$ • The line L_2 of parametric representation: $\begin{cases} x = 10 - 3\mu \\ y = -21 + 12\mu \\ z = 11 - 6\mu \end{cases} \quad (\mu \in \mathbb{R})$ <p>Show that L_1 and L_2 are parallel then determine the coordinates of point B of line L_2 such that the line (AB) is perpendicular to L_1 and L_2.</p>	5 marks

Exercise 3	Calc. : ✗
Solve in \mathbb{R} the equation $16^{x^2} = 2^{4x-1}$.	5 marks

Exercise 4	Calc. : ✗
<p>Calculate the integral:</p> $\int_{-1}^1 \frac{3}{2} (e^{3x} + e^{-3x}) dx.$	5 marks

Exercise 5	Calc. : ✗
<p>A metal chain hangs between two walls.</p> <p>Its height above the ground level can be described by the equation:</p> $h(x) = e^{-x} + e^{x-1} + 2,$ <p>where x is the distance in meters along the ground from the left wall.</p> <p>Calculate how many meters from the left wall this chain is closest to the ground.</p>	5 marks

Exercise 6	Calc. : ✗
<p>In the complex plane, show that the set of points M with affix z checking equality:</p> $ z - 1 - 3i = z + 2 - 3i $ <p>is a straight line for which we give an equation.</p>	5 marks

Exercise 7

Calc. : ✗

An electronic device makes it possible to obtain randomly in whole natural x included, in the broad sense, between 1 and 999 (we are therefore in a situation of equiprobability). Any number between 10 and 99 is written with two digits and any number between 1 and 9 is written with a single digit ; thus the number sixty-two will be displayed 62 and not 062, likewise the number seven will be written 7 and not 007.

- | | |
|---|---------|
| 1. Show that the probability of getting a multiple of 5 is $\frac{199}{999}$. | 3 marks |
| 2. Calculate the probability that the same number appears at least twice times in writing x . | 3 marks |
| 3. In this question we will round the probability of obtaining a multiple from 5 to 0.2.
5 numbers are successively determined using this device.
Calculate the probability that, among these five numbers, three exactly be multiples of five. | 3 marks |
| 4. We model the choice of a real number x in the interval $[1; 999]$ by a random variable following the density law defined by the function $f(x) = \frac{1}{998}$. | |
| (a) What is the probability of rolling a multiple of 5? | 1 mark |
| (b) What is the probability of getting a real less than or equal to 500? | 3 marks |

Exercise 8

Calc. : ✗

Let a be a non-negative real number.
We consider the equation

$$(E) : \ln(x) = ax^2.$$

Study the number of solutions of this equation according to the value of a .

7 marks