Interrogation N° 02

Exercise 1 *(2 pts)*

Lets **f** a function defined by:

$$f(x) = \begin{cases} \frac{1+x}{x}, & x > 0, \\\\ 1 + x^2, & x \leq 0. \end{cases}$$

Determine the set of points where **f** is differentiable?
Determine $f'(x)$ where **f** is differentiable ?

Exercise 2 *(2 pts)*

Find numbers A and B where:

$$\frac{1}{(x)(x+1)} = \frac{A}{x} + \frac{B}{x+1}$$

Deduce the calculation of the following integral:

$$\int_1^4 \frac{1}{(x)(x+1)} dx.$$

Exercise 3 *(6 pts)*: In a study on the effectiveness of fertilizers on plant growth. Height measurements of plants(cm) were taken:

Height x_i	48	50	51	52	57	58
Frequency n_i	3	5	6	3	2	1

1. Determine the variable studied and its nature.

2. Determine the sample size.

3. Represent this distribution using the appropriate diagram.

4. Fill the frequency table(relative frequency f_i, increasing cumulative frequency)

Good luck

Corrigé Type (2)

Exo 1

f(x) is differentiable at $]-\infty, 0[$ and $]0, +\infty[$.
We must check if it is differentiable at 0

$$\lim_{x \to 0} \frac{f(x) - f(0)}{x - 0} = \lim_{x \to 0} \frac{\frac{1+x}{x} - 1}{x}$$

$$= \lim_{x \to 0} \frac{1 + x - 1}{x^2} = +\infty \nexists \text{ (not exist.)}$$

0,5

0,5

$\Rightarrow$ f(x) is not differentiable at $x = 0$,
f(x) is differentiable on $\mathbb{R}^*$

$$f'(x) = \begin{cases} \dfrac{(1+x)'x - (1+x)x'}{x^2} = \dfrac{-1}{x^2} & \text{if } x > 0 \\[2mm] 2x & \text{if } x < 0 \end{cases}$$

①

Exo 2

$$\frac{1}{x(x+1)} = \frac{A}{x} + \frac{B}{x+1} = \frac{A(x+1) + Bx}{x(x+1)} = \frac{(A+B)x + A}{x(x+1)}$$

①

$$\begin{cases} A+B = 0 \\ A = 1 \end{cases} \Rightarrow B = -1$$

$$\frac{1}{x(x+1)} = \frac{1}{x} - \frac{1}{x+1}$$

$$\int_1^4 \frac{1}{x(x+1)} dx = \int_1^4 \frac{1}{x} - \frac{1}{x+1} dx = \int_1^4 \frac{1}{x} dx - \int_1^4 \frac{1}{x+1} dx$$

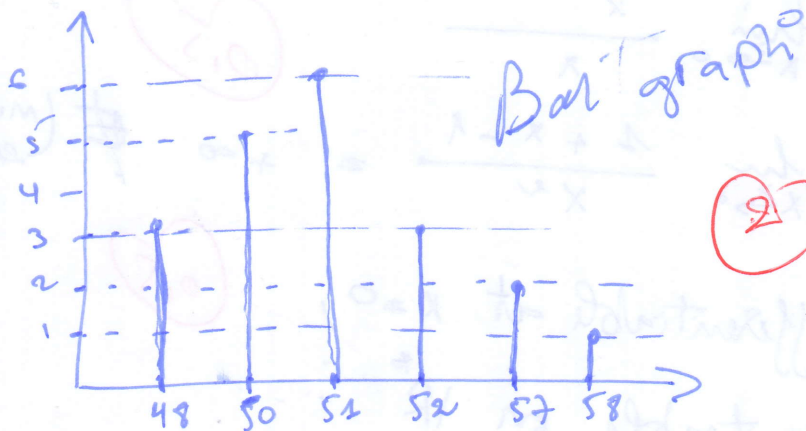$$= \left[\ln|x|\right]_1^4 - \left[\ln|x+1|\right]_1^4$$

$$= \ln 4 - \ln 5 + \ln 2$$

①

EXO 03

* the variable studied is: Height measurments of plants -
* quantitative discret (0,5)

○ the Sample size: $N = 20$ ①

Bar graph   ②

X-axis: 48 50 51 52 57 58

X_i	n_i	f_i	F_i
48	3	0,15	0,15
50	5	0,25	0,40
51	6	0,30	0,70
52	3	0,15	0,85
57	2	0,10	0,95
58	1	0,05	1
Total	20	①	①