

إرشادات عامة: يسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الوارد في المسابقة)

I- (5 points)

The original price of a refrigerator and a television is 2 500 000 LL. After a 10% discount on the price of the refrigerator and a 15% discount on the price of the television, the new price of these two articles will be 2 200 000 LL.

- 1) What is the original price of each of the two articles?
- 2) What is the new price of each of the two articles?

II- (5 points)

The following table shows the lifetime (in minutes) of a sample of 20 batteries:

Lifetime	[60 ;65[[65 ;70[[70 ;75[[75 ;80[[80 ;85[[85 ;90]
Number of batteries	3	1	4	3	8	1

- 1) Calculate the mean \bar{x} of this distribution and give an interpretation of the value thus obtained.
- 2) Determine the modal class and the median class.
- 3) One battery is chosen randomly from these 20 batteries.

Consider the events:

A : « the lifetime of the chosen battery is less than 80 minutes»

B : « the lifetime of the chosen battery is more than or equal to 65 minutes»

Calculate the probabilities P(A), P(B), P(A ∩ B) and P(A/B).

III- (10 points)

Given below the table of variations of a function f that is defined on \mathbb{R} .

(C) is the representative curve of f in an orthonormal system of axes.

x	$-\infty$	2	$+\infty$
$f'(x)$	-	0	+
$f(x)$	1	$-\frac{1}{4}$	1

A- Answer with true or false, justifying your answer:

- 1) (C) has an asymptote parallel to the axis of abscissas.
- 2) $f'(0) < f'(3)$.
- 3) $f(0) < f(1)$.
- 4) (C) cuts the axis of abscissas at one point only.
- 5) The tangent to (C) at the point of abscissa 2 has an equation $y = 1$.

B- Suppose that f , defined on \mathbb{R} , is given by $f(x) = \frac{x^2 - 4x + 3}{x^2 - 4x + 8}$.

- 1) Calculate the coordinates of the points of intersection of (C) with the axis of abscissas.
- 2) Write an equation of the tangent to (C) at the point of abscissa 0.
- 3) Draw (C).

QI	Answer	Mark
1	Let x be the original price of the refrigerator and y that of the television. $x + y = 2\,500\,000$ $x - 0.1x + y - 0.15y = 2\,200\,000$; that is $0.9x + 0.85y = 2\,200\,000$ $x = 1\,500\,000$ LL and $y = 1\,000\,000$ LL	3
2	The new price of the refrigerator is $0.9x = 1\,350\,000$ LL. the new price of the television is $0.85y = 850\,000$ LL.	2

QII	Answer	Mark
1	$\bar{x} = 76.25$. The average lifetime of a battery is 76.25 min.	2
2	The modal class is [80; 85[. The median class is [75; 80[.	1
3	$P(A) = \frac{11}{20}$, $P(B) = \frac{17}{20}$, $P(A \cap B) = \frac{8}{20}$, $P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{8}{17}$.	2

QIII	Answer	Mark
A1	(True). Since $\lim_{x \rightarrow +\infty} f(x) = 1$; $\lim_{x \rightarrow -\infty} f(x) = 1$ then the line of equation $y = 1$ is an asymptote parallel to the axis of abscissas.	1
A2	(True). $f'(0) < 0$, $f'(3) > 0$ thus $f'(0) < f'(3)$.	1
A3	(False). f is decreasing on $] -\infty; 2[$ consequently $f(0) > f(1)$.	1
A4	(False). (C) cuts the axis of abscissas in two points since f(x) decreases from 1 to $-\frac{1}{4}$ then it increases from $-\frac{1}{4}$ to 1.	1
A5	(False). At the point of abscissa 2 the tangent has an equation $y = -\frac{1}{4}$.	1
B1	$f(x) = 0$; $x^2 - 4x + 3 = 0$ pour $x = 1$ ou $x = 3$. The points of intersection with the axis of abscissas are (1,0) and (3,0).	1.5
B2	$y = f'(0)x + f(0)$ $f'(x) = \frac{5(2x - 4)}{(x^2 - 4x + 8)^2}$; to get $y = \frac{-5}{16}x + \frac{3}{8}$	1.5
B3		2