وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات	امتحانات الشهادة الثانوية العامة الفرع : آداب و إنسانيات	الدورة الإستثنائية للعام 2012
عدد المسائل: ثلاث	مسابقة في مادة الرياضيات المدة ساعة	**الاسم:** **الرقم:**

ملاحظة: - 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)

Farid wants to save money in order to secure his child's university education.

He has two offers A and B:

Offer **A** : Depositing, in a savings account , an amount of 20 000 000 LL for a period of 10 years at an annual interest rate of 5% , compounded quarterly.

Offer **B**: Depositing, in a savings account, at the end of every month, an amount of 200 000 LL for a period of 10 years at an annual interest rate of 6%, compounded monthly.

1) a- If Farid chooses offer **A,** calculate the future value at the end of the tenth year**.**

b- If Farid chooses offer **B, c**alculate the future value at the end of the tenth year**.**

2) Which of the two offers is more advantageous for the child ?

II- (5 points)

A gardener has 170 flower bulbs. These bulbs may bloom to give irises or dahlias as indicated in the table below:

Color of the flower / Nature	Red	White	Yellow
Irises	40	10	30
Dahlias	60	20	10

The gardener chooses randomly one of these bulbs to plant.

1) Calculate the probability of each of the following events:

A: « the chosen bulb gives a red flower when it blooms».

B: « the chosen bulb gives a white iris when it blooms».

C: « the chosen bulb gives a non- red dahlia when it blooms».

2) The chosen bulb gives a yellow flower, what is the probability that this yellow flower is a dahlia?

III- (10 points)

Consider the function f defined, over $]-\infty; 0[\cup]0; +\infty[$, by $f(x) = -x + 3 - \frac{4}{x}$

and denote by (C) its representative curve in an orthonormal system $(O; \vec{i}, \vec{j})$.

1) Calculate $\lim\limits_{\substack{x \to 0 \\ x<0}} f(x)$ and $\lim\limits_{\substack{x \to 0 \\ x>0}} f(x)$. Deduce an asymptote to (C).

2) a- Calculate $\lim\limits_{x \to -\infty} f(x)$ and $\lim\limits_{x \to +\infty} f(x)$.

b- Show that the line (D) with equation $y = -x + 3$ is an asymptote to (C).

3) Show that $f'(x) = \frac{-x^2 + 4}{x^2}$.

4) The table below represents the table of variations of f. Copy and complete this table:

x	$-\infty$		-2		0		2		$+\infty$
$f'(x)$		$-$	0			$+$	0		
$f(x)$									

5) Draw (D) and (C).

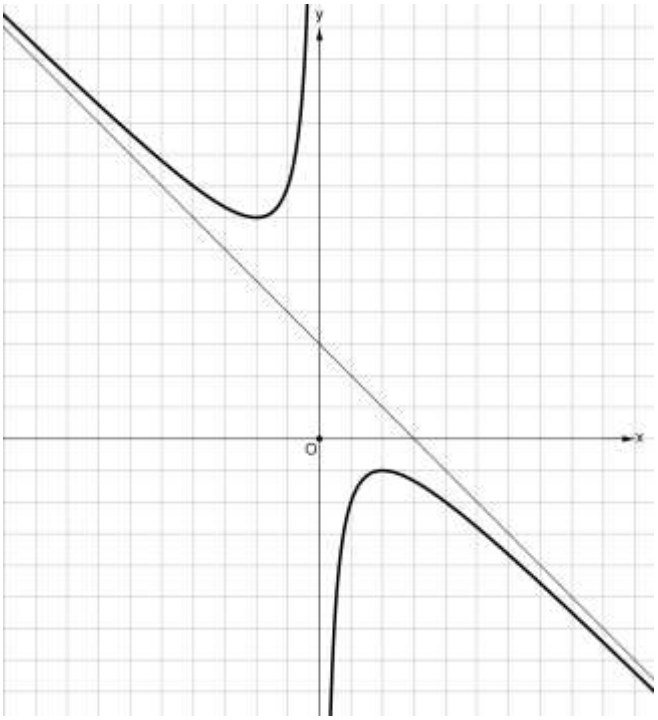
6) a- Calculate the abscissas of the points of intersection of (C) with the line with equation $y = 8$.

b- Solve, graphically, the inequality $f(x) > 8$.

I	Solution	Grade
1a	**A** : $F=P(1+i)^n$, $F = 20\ 000\ 000(1+\frac{0.05}{4})^{40} = 32\ 872\ 389.27$. The future value is LL 32 872 389.27.	2
1b	**B** : $S = R\frac{(1+i)^n-1}{i} = 200000\frac{(1+\frac{0.06}{12})^{120}-1}{\frac{0.06}{12}} = 32775869.36.$ The future value is 32 775 869.36 LL.	2
2	Offer A is more advantageous for the child.	1

II	Solution	Grade
1	$p(A) = \frac{100}{170} = 0.588.$ $p(B) = \frac{10}{170} = 0.0588.$ $p(C) = \frac{30}{170} = 0.1764$	3.5
2	P (a dahlia knowing that it is yellow) = $\frac{10}{40} = 0.25$	1.5

III	Solution	Grade
1	. $\lim_{x\to 0^-} f(x) = 0+3+\infty = +\infty$ and $\lim_{x\to 0^+} f(x) = 0+3-\infty = -\infty$. Then, the line with equation : x = 0 is an asymptote to (C).	1
2a	• $\lim_{x\to+\infty} f(x) = \lim_{x\to+\infty} (-x+3) = -\infty$. • $\lim_{x\to-\infty} f(x) = +\infty$	0.5

2b	$\lim_{x\to-\infty}[f(x)-(-x+3)] = \lim_{x\to-\infty}(-\frac{4}{x}) = 0^+$. $\lim_{x\to+\infty}[f(x)-(-x+3)] = \lim_{x\to+\infty}(-\frac{4}{x}) = 0^-$. Hence, (D) is an asymptote to (C) at $-\infty$ and at $+\infty$.	0.5
3	$f'(x) = -1 + \frac{4}{x^2} = \frac{-x^2+4}{x^2}$	1
4	<table><tr><td>x</td><td>$-\infty$ -2 0 2 $+\infty$</td></tr><tr><td>f ′(x)</td><td>- 0 +	+ 0 -</td></tr><tr><td>f(x)</td><td>$+\infty$ ↘ 7 ↗ $+\infty$	$-\infty$ ↗ -1 ↘ $-\infty$</td></tr></table>	2
5		2
6a	f(x) = 8 then $-x^2+3x-4=8x$ which gives $x^2+5x+4=0$ which is true for x = –1 or x = – 4.	1.5
6b	f(x) >8 when x< -4 or -1<x<0	1.5