وزارة التربية والتعليم العالي المديرية العامة للتربية دائرة الامتحانات الرسميّة	امتحانات الشهادة الثانوية العامة فرع: الآداب والإنسانيات	دورة العام ٢٠١٧ الاستثنائيّة الاثنين في ٧ آب ٢٠١٧
عدد المسائل: ثلاث	مسابقة في مادة الرياضيات المدة: ساعة واحدة	الاسم: الرقم:

ملاحظة: - يسمح باستعمال آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البيانات.
- يستطيع المرشّح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الواردة في المسابقة)

I- (5 points)

Two shirts and three hats cost 105 000 LL.
The price of a shirt is decreased by 10 % while the price of a hat remains the same. After this reduction, the price of three shirts and one hat becomes 96 000 LL.

1) a- Write a system of two equations with two unknowns to model the previous text.
   b- Calculate the original price of one shirt and that of one hat.
2) After reduction, Nadia paid 87 000LL to buy one shirt and some hats.
   How many hats did she buy?

II- (5 points)

In a factory, 25 employees are distributed according to the following table:

Age / Career	[20-30[	[30-40[	[40-50[	[50-60]	**Total**
Engineer	1	4		3	**10**
Workers		4	4	2	
Total	**6**		**6**		**25**

1) Copy and complete the table above.
2) An employee is randomly selected.
   Consider the following events:

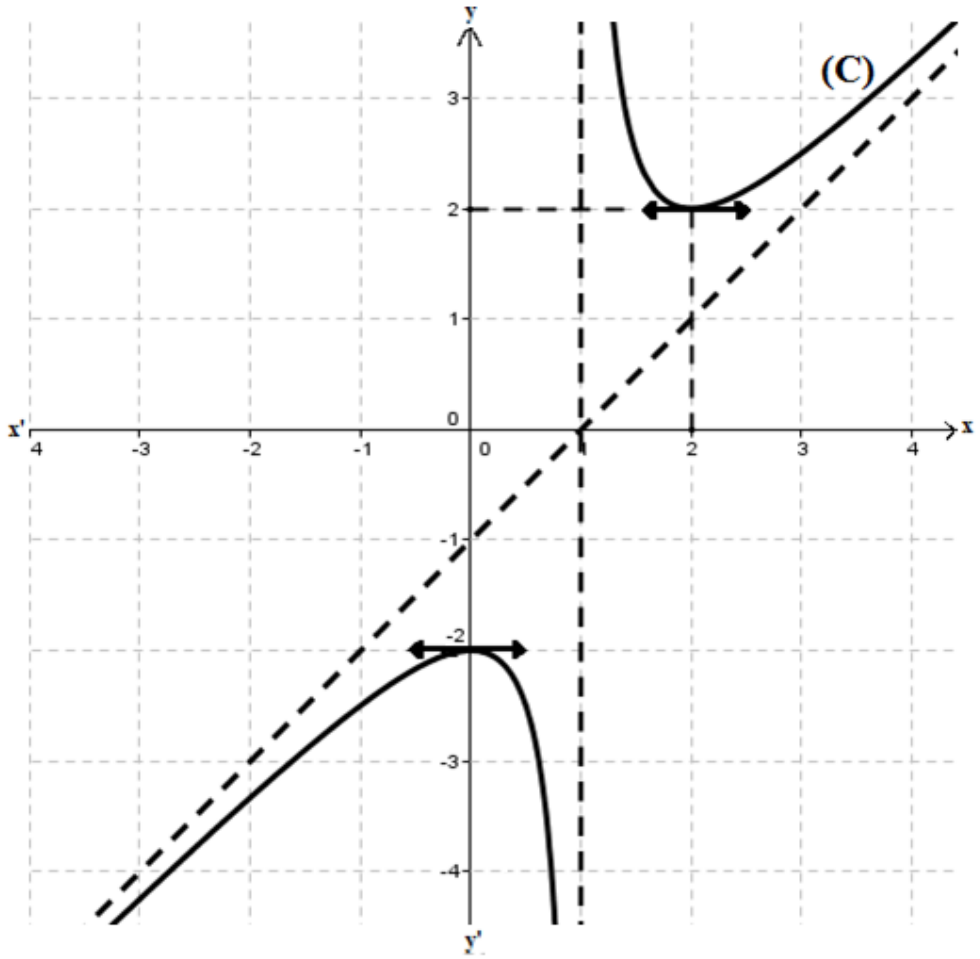
   E: « the selected employee is an engineer »

   F: « the selected employee is strictly less than 40 years old »

   Calculate the following probabilities: P(E), P(F), $P(E/F)$ and $P(E \cap F)$.
3) Knowing that the selected employee is an engineer, calculate the probability that this employee is strictly less than 50 years old.
4) Calculate the average age of the engineers and the average age of the workers, then deduce the average age of the 25 employees.

III- (10 points)

In the figure below, (C) is the representative curve of a function f, in an orthonormal system of axes $(O ; \vec{i} , \vec{j})$.



1) Determine the domain of definition of the function f.

2) a- Determine $\lim\limits_{\substack{x\to 1\\ x<1}} f(x)$ and $\lim\limits_{\substack{x\to 1\\ x>1}} f(x)$.

   b- Deduce the equation of an asymptote (d) to (C).

3) a- Find f(2) and f(0).

   b- Compare f(3) and f(4).

4) a- Set up the table of variations of the function f.

   b- Compare $f'(\frac{1}{2})$ and $f'(-3)$.

5) Solve graphically the inequality $f(x) < -2$.

6) Could we find *x* so that $f(x) = 0$? Justify.

7) Assume that $f(x) = ax + b + \frac{1}{x - 1}$, show that $a = 1$ and $b = -1$.

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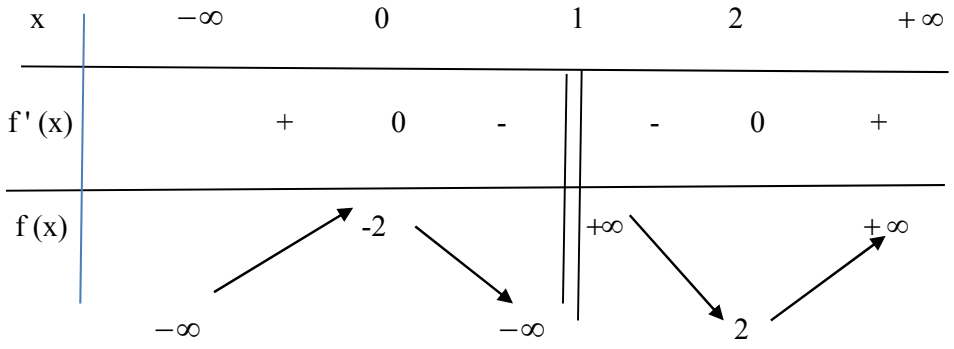
عدد المسائل: ثلاث	أسس تصحيح مادة الرياضيات	

I	Short answers	notes
1a	$\begin{cases} 2x + 3y = 105\,000 \\ 27x + 10y = 96\,000 \end{cases}$	١,٥
1b	x = 30 000 and y = 15 000. The price of one shirt is 30 000LL and the price of one hat is 15 000LL	١,٥
2	The price one shirt after the discount is 27 000LL 27 000 + 15 000 a = 87 000 so a = 4. Nadia bought 4 hats.	٢

II	Short answers	notes
1	<table><tr><td>Age / careers</td><td>[20-30[</td><td>[30-40[</td><td>[40-50[</td><td>[50-60[</td><td>Total</td></tr><tr><td>Engineer</td><td>1</td><td>4</td><td>2</td><td>3</td><td>10</td></tr><tr><td>worker</td><td>5</td><td>4</td><td>4</td><td>2</td><td>15</td></tr><tr><td>Total</td><td>6</td><td>8</td><td>6</td><td>5</td><td>25</td></tr></table>	١
2	$P(E) = \frac{10}{25} = \frac{2}{5}$; $P(F) = \frac{14}{25}$; $P(E/F) = \frac{5}{14}$; $P(E \cap F) = \frac{5}{25} = \frac{1}{5}$.	٢
3	$P(< 50 \text{ years} / E) = \frac{7}{10}$.	١
4	The average age of one engineer is $= \frac{25 + 35 \times 4 + 45 \times 2 + 55 \times 3}{10} = 42$. The average age of one worker is $= \frac{5 \times 25 + 4 \times 35 + 4 \times 45 + 2 \times 55}{15} = 37$. The average age of each of the 25 employees $= \frac{10 \times 42 + 15 \times 37}{25} = 39$	١

III	Short answers	notes
1	$D_f =]-\infty,1[\cup]1,+\infty[$.	٠,٥
2a	$\lim\limits_{\substack{x\to 1 \\ x<1}} f(x) = -\infty$. $\lim\limits_{\substack{x\to 1 \\ x>1}} f(x) = +\infty$.	١
2b	(d) : x = 1 asymptote of (C).	٠,٥
3a	f(2) = 2 et f(0) = – 2.	١
3b	f(3) < f(4).	١
4a		١
4b	f '($\frac{1}{2}$) < f '(– 3) car f '($\frac{1}{2}$) < 0 et f '(– 3) > 0.	١
5	S =] - ∞ ; 0 [∪] 0 ; 1 [.	١
٦	f(x) = 0 doesn't have a solution because (C) doesn't cut (x'x).	١
٧	f(0) = -2 ; b – 1 = – 2 so b = – 1 , f(x) = ax – 1 + $\frac{1}{x-1}$, f(2) = 2 so 2a – 1 + 1 = 2 ; a = 1	٢