نموذج مسابقة (يراعي تعليق الدروس والتوصيف المعدّل للعام الدراسي ٢٠١٦ـ٢٠١٧ وحتى صدور المناهج المطوّرة)

ارشادات عامة : ـ يسمح باستعمال آلة حاسبة غير قابلة للبرمجة او اختزان المعلومات او رسم البيانات.
ـ يستطيع المرشح الإجابة بالترتيب الذي يناسبه دون الالتزام بترتيب المسائل الوارد في المسابقة.

I- (5 points)

The following table shows the results of a random sample of 50 students at a certain high school classified according to gender and age.

Age Gender	[14,16[	[16,18[	[18, 20]	**Total**
Boys		8		
Girls	3	10		25
Total			14	50

1) Complete the missing values in the given table.

2) One student is selected at random from the 50-students sample. Calculate the probability of selecting|:

   a) A girl whose age is below 16 years.

   b) Either a girl or a student whose age is 18 years or above.

   c) A boy knowing that he is older than 18 years.

3) Two differents students are selected one after another. What is the probability that the students are of different genders?

II- (5 points)

A bookshop offers a 20 % discount on its articles. The sum of original prices of a pen and a copybook is four times the price of the pen with the discount. The sum of prices of the pen and the copybook after discount is 16000 LBP.

1) Calculate the original price of the pen and that of the copybook**.**

2) Deduce the price of each item after the discount.

3) Rima benefits from the discount and buys 2 pens and 3 copybooks.
   How much does she pay?

III- (10 points)

Given the function f defined over its domain D and let (C) be its representative curve in an

orthonormal system $(O;\vec{i},\vec{j})$. (See figure)
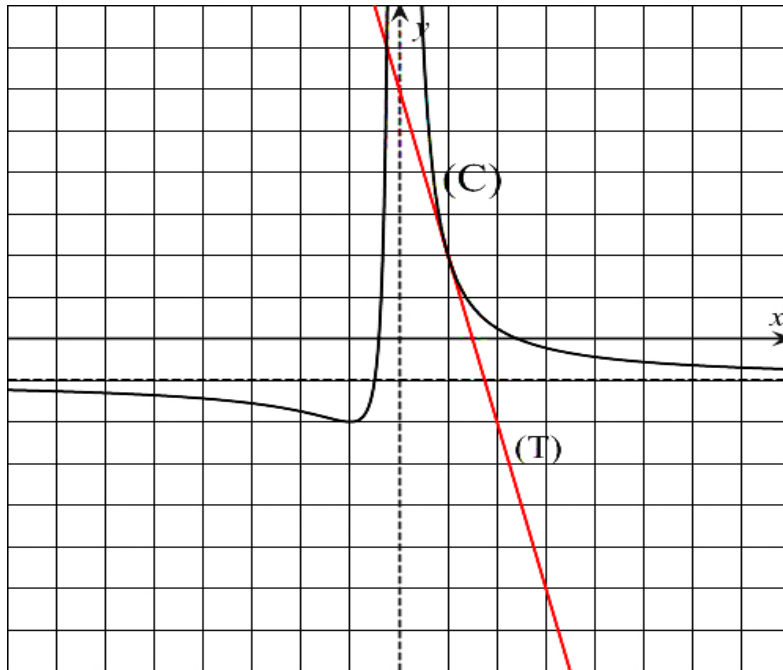
Using the curve, answer to the questions 1. to 6.

1) Determine the domain of definition D of f

2) Find the limits: $\lim\limits_{x \to 0^-} f(x)$, $\lim\limits_{x \to 0^+} f(x)$, $\lim\limits_{x \to -\infty} f(x)$, and $\lim\limits_{x \to +\infty} f(x)$. Give a geometric

   interpretation of the obtained results.

3) Copy and complete the following using the symbols $<, >$, or $=$

   a) $f'(-1)$........0

   b) $f'(2)$........0

   c) $f(-1)$.......-2

   d) $f(-4)$......$f(-3)$

4) Determine the sign of $f(x)$ over $]-\infty,-1]$

5) Find an equation of the tangent (T) to (C) at $x = 1$. Deduce the value of $f'(1)$.

6) Set up the table of variations of f .

7) In what follows, assume that: $f(x) = \dfrac{-x^2 + 2x + 1}{x^2}$.

   a) Solve for $x, -x^2 + 2x + 1 = 0$. Deduce the points of intersection between (C) and the x-axis

   b) Verify that $f'(x) = \dfrac{-2x(x+1)}{x^4}$.

أسس التصحيح (تراعي تعليق الدروس والتوصيف المعدّل للعام الدراسي ٢٠١٦-٢٠١٧ وحتى صدور المناهج المطوّرة)

Solution

Question 1

1) Table (1pt)

Gender/Age	[14,16[	[16,18[	[18,20]	Total
Boys (B)	15	8	2	25
Girls (F)	3	10	12	25
Total	18	18	14	50

2) Probability (1pt+1pt+1pt)

a) $\dfrac{3}{50}$

b) $P(G \text{ or } age \geq 18) = \dfrac{25}{50} + \dfrac{14}{50} - \dfrac{12}{50} = \dfrac{27}{50}$

c) $P(B / Age \geq 18) = \dfrac{2}{14} = \dfrac{1}{7}$

3) $P(BG \text{ or } GB) = \dfrac{25}{50} \bullet \dfrac{25}{49} + \dfrac{25}{50} \bullet \dfrac{25}{49} = \dfrac{25}{49}$ (1pt)

Question 2

1) x : original price of a pen
y : original price of a copybook (1pt)

From the given we get the following system

$\begin{cases} x + y = 4(0.8x) \\ 0.8x + 0.8y = 16000 \end{cases}$ (2pt)

$x = 6250 LBP$

$y = 13750 LBP$

2) $0.8x = 5000 \text{ LBP}$
$\underline{0.8y = 11000 \text{ LBP}}$ (1pt)

3) Rima paid a sum equals to: $2 \times 5000 + 3 \times 11000 = 43000 LBP$ (1pt)

Question 3

1) $]-\infty,0[\,\cup\,]0,+\infty[$ (0.5pt)

2) $\lim\limits_{x\to 0^-} f(x)=+\infty$, $\lim\limits_{x\to 0^+} f(x)=+\infty$, $\lim\limits_{x\to -\infty} f(x)=-1$ and $\lim\limits_{x\to +\infty} f(x)=-1$ (2pts)

   $x=0$ V.A.
   $y=-1$ HA (1pt)

3) Complete
   1) $f\,'(-1)=0$

   2) $f\,'(2)<0$

   3) $f(-1)=-2$

   4) $f(-4)>f(-3)$ (1.5pt)

4) $f(x)<0$ over $]-\infty,-1]$ (0.5pt)

5) Tangent passes through (1,2) and (0,6): $y=-4x+6$ then f ' (1) = - 4 (1pt)

6) (1.5pts)

x	$-\infty$		-1		0		$+\infty$
f'(x)		$-$	0	$+$	$\|\|$	$-$	
f(x)							

7)
   1) $x=1\pm\sqrt{2}$ then $(1+\sqrt{2}\,;0)$ and $(1-\sqrt{2}\,;0)$ are the two points of intersection of (C) and (x'x) (1pt)

   2) $f\,'(x)=\dfrac{-2x(x+1)}{x^{4}}$ (1pt)