


<p>المادة: رياضيات – لغة إنكليزية الشهادة: الثانوية العامة الفرع: الآداب والانسانيات نموذج رقم: 2 / 2019 المدة: ساعة واحدة</p>	<p>الهيئة الأكاديمية المشتركة قسم: الرياضيات</p>	 <p>المركز التربوي للبحوث والإنماء</p>
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ملاحظة: يُسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو اختزان المعلومات أو رسم البيانات.
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الواردة في المسابقة).

I- (5 points)

A box contains 9 balls as follows:

- **Three** red balls numbered 1, 2, 3,
- **Four** blue balls numbered 4, 5, 6, 7
- **Two** white balls numbered 8, 9.

Part A

One ball is randomly selected from this box. Consider the following events:

R : The ball selected is red.

B : The ball selected is blue.

W: The ball selected is white.

E: The ball selected has an even number.

1- a) Calculate $P(B)$ and $P(E)$.

b) Show that $P(B \cup E) = \frac{2}{3}$.

2- Calculate $P(B/\bar{E})$.

3- Knowing that the ball selected has a number greater than 4, calculate the probability that this ball is white.

Part B

In this part, suppose that two balls are selected from the box one after another without replacement.

1- Calculate the probability that these two balls are not red.

2- Calculate the probability that one ball is red and the second ball has an even number greater than 3.

II- (5 points)

Rima has an amount of 39 000 LL.

This amount is formed by bills of 5 000 LL and bills of 1 000 LL.

The number of bills of 5 000 LL is $\frac{2}{3}$ that of bills of 1 000 LL.

1- Solve the system
$$\begin{cases} 5x + y = 39 \\ 3x - 2y = 0 \end{cases}$$

2- a) Show that the text given above is modeled by the system in 1.

b) Find the number of bills of each category.

3- Rima wants to buy a calculator that costs 40 000 LL, but this calculator is offered at a discount of 20 %.

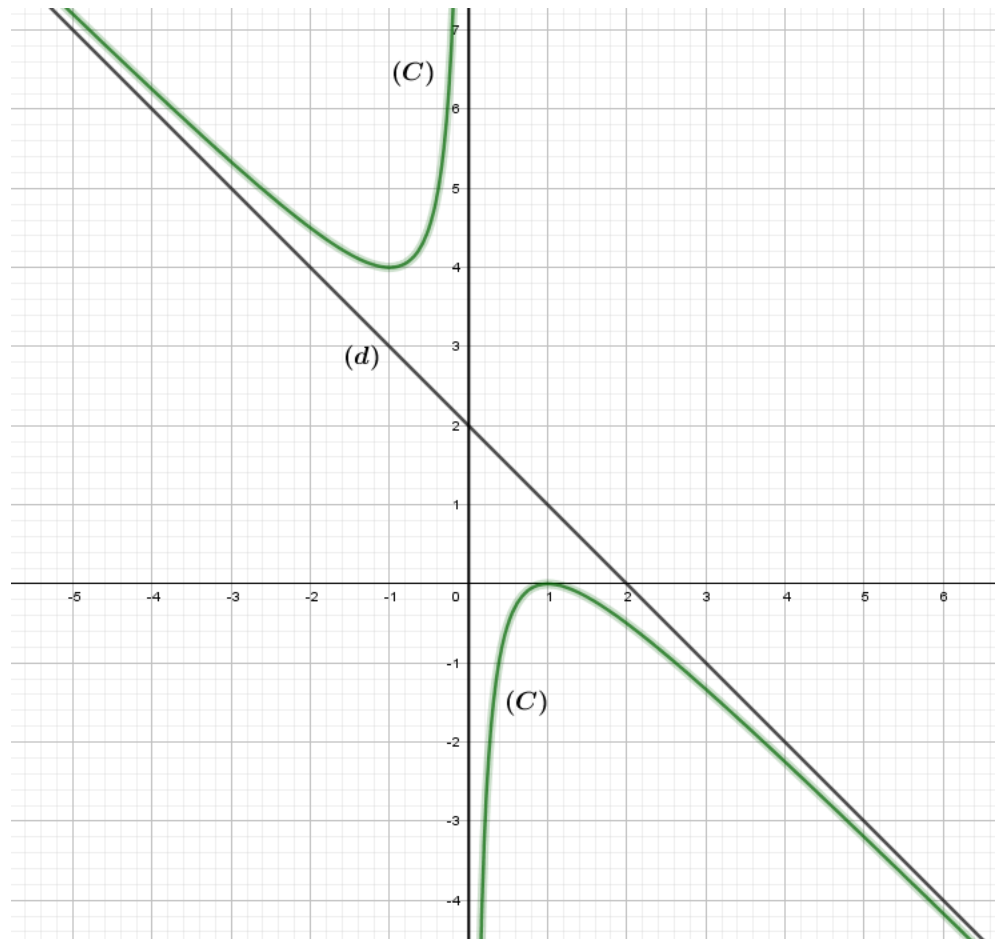
She plans to pay the discount price by using bills of the categories mentioned above at a time.

How can this be done?


III- (10 points)

The next graph (C) is that of the function f defined over $\mathbb{R} - \{0\}$ as:

$$f(x) = ax + b + \frac{c}{x}.$$



- 1- a) Write an equation of the vertical asymptote to (C) .
 b) Write an equation of the oblique asymptote (d) to (C) .
 Deduce that $a = -1$ and $b = 2$.
 c) Use that the point $L(1,0)$ is on (C) , calculate c .
- 2- a) Calculate $f'(1)$ and $f'(-1)$ graphically.
 b) Solve graphically $f(x) \geq 0$.
- 3- Let (d) be the line joining the vertices of (C) (Max and min).
 a) Show that $y = -2x + 2$ is an equation of (d) .
 b) Solve graphically $f(x) + 2x > 2$.
- 4- a) Verify that $f(x) = \frac{-x^2 + 2x - 1}{x}$.
 b) By referring to the graph, set up the table of variations of f .
- 5- a) Show that $f'(x) = -1 + \frac{1}{x^2}$.
 b) Write an equation of (T) , the tangent to (C) at the point A with $x_A = \frac{1}{2}$.
 c) Determine another point B on (C) where the tangent at B to (C) is parallel to (T) .

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أسس التصحيح

<u>QI</u>	<u>Answers</u>	<u>pts</u>
1-a)	$P(B) = \frac{4}{9} ; P(E) = \frac{4}{9}.$	0.5
b)	$P(B \cup E) = P(B) + P(E) - P(B \cap E) = \frac{8}{9} - \frac{2}{9} = \frac{2}{3}.$	1
2-	$P(B/\bar{E}) = \frac{P(B \cap \bar{E})}{P(\bar{E})} = \frac{2}{5}$	1
3-	$P(w/n > 4) = \frac{P(w \cap (n > 4))}{P(n > 4)} = \frac{2}{5}.$	1
4-a)	$P(\bar{R}\bar{R}) = \frac{6}{9} \times \frac{5}{8} = \frac{5}{12}.$	0.75
b)	$P(R, E > 3) + P(E > 3, R) = \frac{3}{9} \times \frac{3}{8} + \frac{3}{9} \times \frac{3}{8} = \frac{1}{4}$	0.75

<u>QII</u>	<u>Answers</u>	<u>Pts</u>
1	$x = 6, y = 9$	1
2-a)	$x =$ number of 5 000 LL bills. $y =$ number of 1 000 LL bills. $x = 6$ and $y = 9$ $5\,000x + 1\,000y = 39\,000$ or $5x + y = 39$ $x = \frac{2}{3}y$ then $3x - 2y = 0$ (verified)	1
b)	6 bills of 5 000 and 9 bills of 1 000.	1
3-	Discount price = $40\,000 \times 0.8 = 32\,000$ Rima can pay: $6 \times 5\,000 + 2 \times 1\,000$ or $5 \times 5\,000 + 7 \times 1\,000$	2

QIII	Answers	Pts																		
1-a)	$(y'y)$ or $x = 0$ is vertical asymptote.	0.5																		
b)	$(y = -x + 2)$ is an equation of oblique asymptote but $y = ax + b$ is an equation of oblique asymptote then $a = -1$ and $b = 2$.	1																		
c)	$f(x) = -x + 2 + \frac{c}{x}$ but $(1,0)$ is on (C) then $0 = -1 + 2 + c$ then $c = -1$ hence $f(x) = -x + 2 - \frac{1}{x}$	0.5																		
2-a)	$f'(1) = 0 = f'(-1)$ Graphically (Tangent parallel to $x'x$).	0.5																		
b)	$f(x) \geq 0$ then $x < 0$ or $x = 1$.	1																		
3-a)	Min $(-1, 4)$ and Max $(1,0)$ then $y = -2x + 2$.	0.5																		
b)	$f(x) + 2x > 2$ then $f(x) > -2x + 2$. Consider the part of (C) above (d) thus $-1 < x < 0$ or $x > 1$.	1																		
4-a)	$f(x) = -x + 2 - \frac{1}{x} = \frac{-x^2 + 2x - 1}{x}$.	0.5																		
b)	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">x</td> <td style="padding: 5px;">$-\infty$</td> <td style="padding: 5px;">-1</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">1</td> <td style="padding: 5px;">$+\infty$</td> </tr> <tr> <td style="padding: 5px;">f'</td> <td style="padding: 5px;">$-$</td> <td style="padding: 5px;">$+$</td> <td style="padding: 5px;">$+$</td> <td style="padding: 5px;">$-$</td> <td style="padding: 5px;">$-$</td> </tr> <tr> <td style="padding: 5px;">$f(x)$</td> <td style="padding: 5px;">$+\infty$</td> <td style="padding: 5px;">4</td> <td style="padding: 5px;">$+\infty$</td> <td style="padding: 5px;">0</td> <td style="padding: 5px;">$-\infty$</td> </tr> </table>	x	$-\infty$	-1	0	1	$+\infty$	f'	$-$	$+$	$+$	$-$	$-$	$f(x)$	$+\infty$	4	$+\infty$	0	$-\infty$	1.5
x	$-\infty$	-1	0	1	$+\infty$															
f'	$-$	$+$	$+$	$-$	$-$															
$f(x)$	$+\infty$	4	$+\infty$	0	$-\infty$															
5-a)	$f'(x) = -1 + \frac{1}{x^2}$	1																		
b)	$A(\frac{1}{2}, -\frac{1}{2})$ and $f'(\frac{1}{2}) = 3$. $(T) : y + \frac{1}{2} = 3(x - \frac{1}{2})$ and $y = 3x - 2$	1																		
c)	$f'(x) = 3$ then $\frac{1}{x^2} = 4; x^2 = \frac{1}{4}$ and $x = -\frac{1}{2}$. then $B(-\frac{1}{2}, \frac{9}{2})$.	1																		