This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

SE01 Exam

09NOV2026

Do NOT write in this box. Your MARK will be placed here.

Subject :	Maths
Class :	11S1 and 11S2
Teacher :	Taline Hawatian
Duration :	1 hour
You are to answer the questions to this exam on : Squared paper	
Your name :	*Time taken to complete exam*
Your Class :	
Exam Room :	
How many sheets, including cover sheet :	

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

I.- (12 points)

Consider the equation (E) in x: $(m-2)x^2 - 2mx + 2m - 3 = 0$, where

m is a real parameter, x_1 and x_2 are its roots when they exist.

1) Determine m so that the equation has a single root. Calculate the single root.
2) Show that the discriminant $\Delta' = -m^2 + 7m - 6$.
3) Discuss, according to the values of m, the existence of the roots of (E).
4) Calculate m so that x_1 and x_2 are distinct roots that have opposite signs.
5) Can you find values of m for which x_1 and x_2 are opposites? Justify your answer.
6) Find a relation independent of m that exists between x_1 and x_2.

II.- (3 points)

Solve the following equation: $1 + \sqrt{x^2 + 5x - 5} = 2x$.

III.- (5 points)

1) Without using a calculator, factorize the polynomial:

   $P(x) = 2x^3 - 7x^2 - 5x + 4$

2) Solve the following system of inequalities:

$$\begin{cases} \frac{7x^2-5x-15}{4x^2-3x-7} \leq 2 \\ 2x^3 - 7x^2 - 5x + 4 > 0 \end{cases}$$

SE01/20262027/Maths/11S1S2

I- $(E): (m-2)x^2 - 2mx + 2m - 3 = 0$ — 1

1) $a = 0 \quad m-2=0 \quad m=2 \quad -4x+4-3=0 \quad -4x=-1 \quad x=\frac{1}{4}$.

2) $\Delta' = b'^2 - ac$
$= m^2 - (m-2)(2m-3)$
$= m^2 - (2m^2 - 3m - 4m + 6)$ — 1.5
$= m^2 - 2m^2 + 7m - 6 = -m^2 + 7m - 6$

3) $\Delta' = 0 \quad -m^2+7m-6=0 \quad a+b+c=0 \quad m_1 = 1 \quad m_2 = 6$

m	$-\infty$		1		6		$+\infty$
Δ'		$-$	ϕ	$+$	ϕ	$-$	

1

$\Delta' < 0$ for $m \in]-\infty; 1[\cup]6; +\infty[$
(E) has no real roots for $m \in]-\infty; 1[\cup]6; +\infty[$. — 1
$\Delta' = 0$ for $m = 1$ and $m = 6$ double roots
$m=1 \quad x_1 = x_2 = \frac{-b'}{a} = \frac{m}{m-2} = -1$ 1 double root
$m=6 \quad x_1 = x_2 = \frac{m}{m-2} = \frac{6}{4} = \frac{3}{2}$ 1 double root
} 2 double roots — 1.5

$\Delta' > 0$ for $m \in]1; 6[$ 2 distinct roots
(E) has 2 distinct real roots for $m \in]1; 6[- \{2\}$ — 1
$x_1, x_2 = \frac{m \pm \sqrt{-m^2+7m-6}}{m-2}$

4) x_1 and x_2 are distinct roots having opposite signs.

$P < 0 \quad P = \frac{2m-3}{m-2}$ — 0.5

m	$-\infty$		$\frac{3}{2}$		2		$+\infty$
P		$+$	ϕ	$-$	∄	$+$	

0.5

$P < 0$ for $m \in]\frac{3}{2}; 2[$. — 0.5

5) x_1 and x_2 are opposites. $x_1 = -x_2$ $x_1 + x_2 = 0$ $S = 0$.

$\frac{2m}{m-2} = 0$ $m = 0$ and $m \neq 2$.

but for $m = 0$ $\Delta' < 0$ no real roots 1

$\Rightarrow x_1$ and x_2 cannot be opposites.

6) $P = \frac{2m-3}{m-2}$ $S = \frac{2m}{m-2}$

$mP - 2P = 2m - 3$ $mS - 2S = 2m$

$mP - 2m = 2P - 3$ $mS - 2m = 2S$ 0.5

$m(P-2) = 2P-3$ $m(S-2) = 2S$ 0.5

$m = \frac{2P-3}{P-2}$ $m = \frac{2S}{S-2}$

$m = m$ $\frac{2P-3}{P-2} = \frac{2S}{S-2}$ 0.5

$2PS - 4P - 3S + 6 = 2PS - 4S$

$-4P - 3S + 6 + 4S = 0$ 0.5

$S - 4P + 6 = 0$ $x_1 + x_2 - 4x_1x_2 + 6 = 0$

II) $1 + \sqrt{x^2+5x-5} = 2x$

$\sqrt{x^2+5x-5} = 2x - 1$ square both sides 1

$x^2 + 5x - 5 = 4x^2 - 4x + 1$ 1

$(-3x^2 + 9x - 6 = 0) \div (-3)$ $x^2 - 3x + 2 = 0$ $x_1 = 1$ $x_2 = 2$

$(a + b + c = 1 - 3 + 2 = 0)$

$1 + \sqrt{1+5-5} \stackrel{?}{=} 2$ $1 + 1 \stackrel{?}{=} 2$ $2 = 2$ verified $x_1 = 1$ accepted

$1 + \sqrt{4+10-5} \stackrel{?}{=} 4$ $1 + 3 \stackrel{?}{=} 4$ $4 = 4$ verified 1 $x_2 = 2$ accepted

III) 1) $P(x) = 2x^3 - 7x^2 - 5x + 4$

$P(-1) = -2 - 7 + 5 + 4 = 0$

$(x+1)$ is a factor of $P(x)$.

-1	2	-7	-5	4
	0	-2	9	-4
	2	-9	4	0

$P(x) = (x+1)(2x^2 - 9x + 4)$ 1

$Q(x) = 2x^2 - 9x + 4$

$Q(4) = 32 - 36 + 4 = 0$

$Q(x) = (x-4)(2x-1)$

$P(x) = (x+1)(x-4)(2x-1)$

(4)

	2	-9	4
4	0	8	-4
	2	-1	0

2) $\begin{cases} \dfrac{7x^2-5x-15}{4x^2-3x-7} \leq 2 \\ 2x^3-7x^2-5x+4 > 0 \end{cases}$

$\dfrac{7x^2-5x-15}{4x^2-3x-7} - 2 \leq 0$ ✓0.5 $\dfrac{7x^2-5x-15-8x^2+6x+14}{4x^2-3x-7} \leq 0$

$\dfrac{-x^2+x-1}{4x^2-3x-7} \leq 0$ $\quad -x^2+x-1 \quad \Delta = 1-4 = -3 < 0$ no real roots

$-x^2+x-1 < 0$ for all x in $\mathbb{R}$. ✓0.5

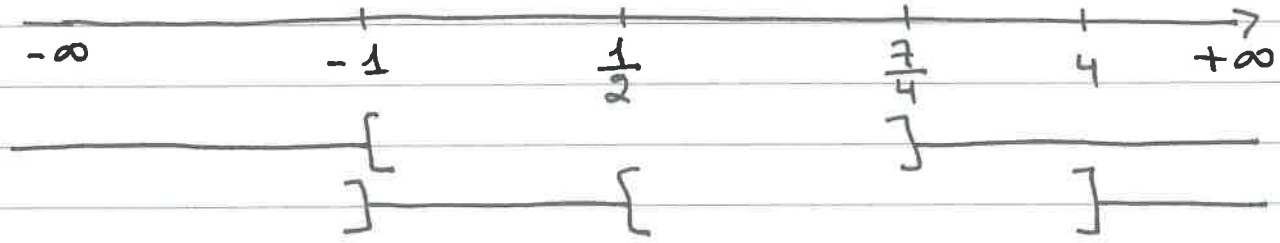
$4x^2-3x-7 \neq 0 \quad x_1 \neq -1 \quad x_2 \neq \frac{7}{4}$

x	$-\infty$		-1		$\frac{7}{4}$		$+\infty$
$-x^2+x-1$		−		−		−	
$4x^2-3x-7$		+	‖	−	‖	+	
		−	‖	+	‖	−	

✓1 $S_1 =]-\infty; -1[\cup]\frac{7}{4}; +\infty[$

x	$-\infty$		-1		$\frac{1}{2}$		4		$+\infty$
$P(x)$		−	‖	+	‖	−	‖	+	

✓1 $S_2 =]-1; \frac{1}{2}[\cup]4; +\infty[$



$S =]4; +\infty[$ ✓1