This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

Loueizeh - Baabda

SE01 Exam

10NOV2025

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

Subject :	Maths	
Class :	11SE	
Teacher :	Mr. George Mouhayar	
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. (4.5 points)

Solve the following equations using the quadratic formula.

a) $-x^2 + 24 = 5x$

b) $4x^2 + 12x + 9 = 0$

c) $3x(2x - 1) = 2(1 - x)$

II. (4 points)

Reduce the following equation to a quadratic equation then solve. (Check your answers)

$$1 + \sqrt{x^2 - 3x + 3} = 2x$$

III. (9.5 points)

Given the parametric quadratic equation:

$$(m + 4)x^2 - 2(m + 1)x + m = 0$$

a) For what values of m is this equation quadratic?

b) Calculate the discriminant Δ in terms of m and show that $\Delta = -8m + 4$

c) Calculate in terms of m the sum S, and the product P of the roots.

d) For what value of m does this equation admit one double root? Calculate this root.

e) For what values of m does this equation admit no real roots?

f) For what values of m does this equation admit two real distinct roots? Write them in terms of m.

g) For what value of m does this equation admit two reciprocal roots?

IV. (6 points)

Solve the following inequality.

$$\frac{x^2 - 5x + 6}{x - 4} \geq 0$$

V. (6 points)

Solve the following system of inequalities.

$$\begin{cases} 2x^2 + 4x - 6 \leq 0 \\ -2x^2 - x + 1 < 0 \end{cases}$$

Solution For SE01 — Class 1

11 SE - 2025 2026

Maths

I.

a) $-x^2 + 24 = 5x$

$-x^2 - 5x + 24 = 0$

$a = -1 \quad b = -5 \quad c = 24$

$\Delta = b^2 - 4ac$

$= (-5)^2 - 4(-1)(24)$

$= 121$

$\Delta > 0 \Rightarrow$ two distinct roots

$x_1 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{5 + 11}{-2}$

$x_1 = -8$

$x_2 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{5 - 11}{-2}$

$x_2 = 3$

(1.5)

b) $4x^2 + 12x + 9 = 0$

$a = 4 \quad b = 12 \quad c = 9$

$\Delta = b^2 - 4ac$

$= (12)^2 - 4(4)(9)$

$= 0$

$\Delta = 0 \Rightarrow$ one double root

$x_1 = x_2 = \frac{-b}{2a} = \frac{-12}{2(4)} = -\frac{3}{2}$

(1.5)

c) $3x(2x - 1) = 2(1 - x)$

$6x^2 - 3x = 2 - 2x$

$6x^2 - x - 2 = 0$

$a = 6 \quad b = -1 \quad c = -2$

$\Delta = b^2 - 4ac$

$= (-1)^2 - 4(6)(-2)$

$= 49$

$\Delta > 0 \Rightarrow$ two distinct roots

(2)

$x_1 = \frac{-b + \sqrt{\Delta}}{2a} = \frac{1 + 7}{2(6)}$

$x_1 = \frac{2}{3}$

$x_2 = \frac{-b - \sqrt{\Delta}}{2a} = \frac{1 - 7}{2(6)}$

$x_2 = -\frac{1}{2}$

II. $1 + \sqrt{x^2 - 3x + 3} = 2x$

$2x - 1 \geq 0$

$2x \geq 1$

$x \geq \frac{1}{2}$

$\left(\sqrt{x^2 - 3x + 3}\right)^2 = (2x - 1)^2$

$x^2 - 3x + 3 = 4x^2 - 4x + 1$ (0.5)

$-3x^2 + x + 2 = 0$ (0.5)

$a = -3 \quad b = 1 \quad c = 2$

$\Delta = b^2 - 4ac$

$= 1^2 - 4(-3)(2)$

$= 25$ (0.5)

$\Delta > 0 \Rightarrow$ two distinct roots

$x_1 = \frac{-b + \sqrt{\Delta}}{2a} \qquad x_2 = \frac{-b - \sqrt{\Delta}}{2a}$ (1)

$x_1 = -\frac{2}{3} \qquad x_2 = 1$

rejected accepted

checking:

$x = -\frac{2}{3}$ (1)

$\sqrt{\left(-\frac{2}{3}\right)^2 - 3\left(-\frac{2}{3}\right) + 3} = 2\left(-\frac{2}{3}\right) - 1$

$\sqrt{\frac{49}{9}} \neq -\frac{7}{3}$

$x = 1$

$\sqrt{1 - 3 + 3} = 2(1) - 1$

$1 = 1$

III. $(m+4)x^2 - 2(m+1)x + m = 0$

a) this equation is quadratic for $a \neq 0$ (0.5)

$m + 4 \neq 0$

$m \neq -4 \qquad m \in \mathbb{R} - \{-4\}$

b) $a = m + 4 \quad b = -2(m+1) \quad c = m$

$\Delta = b^2 - 4ac$

$= [-2(m+1)]^2 - 4(m+4)(m)$ (1.5)

$= 4(m+1)^2 - 4(m^2 + 4m)$

$= 4(m^2 + 2m + 1) - 4m^2 - 16m$

$= 4m^2 + 8m + 4 - 4m^2 - 16m$

$\Delta = -8m + 4$ verified

c) $S = -\frac{b}{a} = \frac{2(m+1)}{m+4}$

$P = \frac{c}{a} = \frac{m}{m+4}$ (1)

d) one double root $\Rightarrow \Delta = 0$

$-8m + 4 = 0$

$-8m = -4$

$m = \frac{1}{2}$ (0.5)

$x_1 = x_2 = \frac{-b}{2a} = \frac{2(m+1)}{2(m+4)} = \frac{\frac{1}{2}+1}{\frac{1}{2}+4} = \frac{1}{3}$ (1)

e) no real roots $\Rightarrow \Delta < 0$

$-8m + 4 < 0$

$-8m < -4$

$m > \frac{1}{2}$ (1)

f) two real distinct roots $\Rightarrow \Delta > 0$

$-8m + 4 > 0$

$-8m > -4$

$m < \frac{1}{2}$ and $m \neq -4$ (0.5)

$\Delta = 4(1-2m)$ (1)

$x_1 = \frac{-b + \sqrt{\Delta}}{2a}$

$= \frac{2(m+1) + 2\sqrt{1-2m}}{2(m+4)}$

$x_1 = \frac{m+1+\sqrt{1-2m}}{m+4}$ (1)

$x_2 = \frac{-b - \sqrt{\Delta}}{2a}$

$x_2 = \frac{m+1-\sqrt{1-2m}}{m+4}$

g) $x_1 = \frac{1}{x_2}$

$x_1 \cdot x_2 = 1$

$P = 1$

$\frac{m}{m+4} = 1$ (1.5)

$m+4 = m$

$0m = -4$ no solution

Impossible to have

IV $\dfrac{x^2-5x+6}{x-4} \geq 0$

$x^2-5x+6=0$

$\Delta = b^2-4ac$

$= (-5)^2-4(1)(6)$

$= 25-24$

$= 1$

$a=1$, $a>0$

$\Delta > 0 \Rightarrow$ two distinct roots

$x_1 = 2 \quad x_2 = 3$ (1)

$x-4 \neq 0$

$x \neq 4$ (0.5)

x	$-\infty$		2		3		4		$+\infty$
x^2-5x+6		$+$	0	$-$	0	$+$		$+$	(1)
$x-4$		$-$		$-$		$-$	$\nexists$	$+$	(1)
$\dfrac{x^2-5x+6}{x-4}$		$-$	0	$+$	0	$-$	$\nexists$	$+$	(0.5)

$S = [2;3] \cup]4;+\infty[$ (2)

II $\begin{cases} 2x^2+4x-6 \leq 0 \\ -2x^2-x+1 < 0 \end{cases}$

1st inequality:

$2x^2+4x-6 \leq 0$

$2x^2+4x-6=0$

$\Delta = b^2-4ac$

$= 64$

$\Delta > 0$, $a>0$ $\quad x_1 = 1 \quad x_2 = -3$ (1)

x	$-\infty$		-3		1		$+\infty$
S_1		$+$	0	$-$	0	$+$	

$S_1 = [-3;1]$ (1)

2nd inequality:

$-2x^2-x+1 < 0$

$-2x^2-x+1=0$

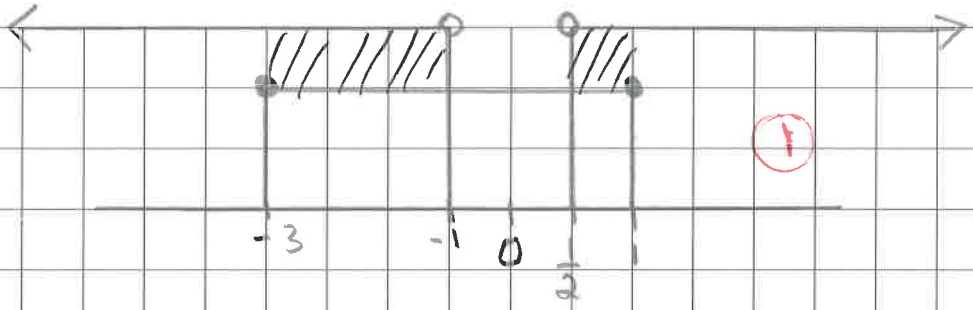
$\Delta = b^2-4ac$

$= 9$

$\Delta > 0$, $a<0$ $\quad x_1 = -1 \quad x_2 = \frac{1}{2}$ (1)

x	$-\infty$		-1		$\frac{1}{2}$		$+\infty$
S_2		$-$	0	$+$	0	$-$	

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



$S = [-3; -1[\cup]\frac{1}{2}; 1]$

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