This is a Class 1 exam

Lebanon Evangelical School for Boys and Girls

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 :	12SE	
Teacher :	Nicolas Kordahi	
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.

Exercise 1 (15pts)

A. Evaluate the following:
1. $\ln(e^3)$
2. $\ln(1)$
3. $\ln(e^{-2})$

B. Expand using the properties of ln.
1. $\ln(5x^3)$
2. $\ln(\frac{x^2.\sqrt{y}}{z^3})$

C. Express as a single natural logarithm.

$2\ln(x) + 3\ln(y) - \ln(z)$

Exercise 2 (15pts)

Solve the following equations. Show all your work.

A. $\ln(x+2) = 2$
B. $\ln(x) + \ln(x-1) = \ln 6$
C. $2\ln(x) - \ln(x-2) = \ln 4$

Exercise 3 (20pts)

$$f(x) = \ln(x-1) - \ln(x+1)$$

A. Domain and limits:
1. Determine the domain of *f*.
2. Calculate the limits $\lim_{x\to 1^+} f(x)$ and $\lim_{x\to+\infty} f(x)$
3. Deduce the equations of the vertical and horizontal asymptotes.

B. Derivatives and Variations:
1. Calculate *f'(x)*.
2. Determine the table of sign of *f'(x)*.
3. Construct the variation table of *f*.
4. Plot the curve C of *f*.

.....NK.

#1) [A] 1) $\ln e^3 = 3\ln e$
$= 3$ (3.5)

2) $\ln 1 = 0$ (3.5)

3) $\ln e^{-2} = -2\ln e = -2$ (3.5)

[B] 1) $\ln 5x^3 = \ln 5 + \ln x^3$
$= \ln 5 + 3\ln x$ (3.5)

2) $\ln\left(\frac{x^2\cdot\sqrt{y}}{z^3}\right) = \ln x^2\sqrt{y} - \ln z^3$
$= 2\ln x + \frac{1}{2}\ln y - 3\ln z$ (3.5)

[C] $2\ln x + 3\ln y - \ln z = \ln x^2 + \ln y^3 - \ln z$
$= \ln(x^2\cdot y^3) - \ln z$
$= \ln\left(\frac{x^2\cdot y^3}{z}\right)$ (3.5)

#2) [A] $\ln(x+2) = 2$ $\quad x+2 > 0$
$x+2 = e^2$ $\quad x > -2$
$x = e^2 - 2$ accept. (5)

[B] $\ln x + \ln(x-1) = \ln 6$ (5)
$x > 0$
$x-1 > 0 \quad x > 1$
and $x > 1$

$\ln(x)(x-1) = \ln 6$
since $\ln x$ is st. $\nearrow$ fnct°

$x(x-1) = 6$
$x^2 - x - 6 = 0$

$x' = 3$ accept $\quad x'' = -2$ rej.

C) $2\ln x - \ln(x-2) = \ln 4 \qquad x > 0$

$x-2 > 0 \quad x > 2 \quad$ cond $x > 2$

$\ln x^2 - \ln(x-2) = \ln 4$

$\ln\left(\frac{x^2}{x-2}\right) = \ln 4$ since $\ln x$ is a St. ↑ fnct°

$\frac{x^2}{x-2} = 4$ (5)

$x^2 - 4x + 8 = 0$ No solution in $\mathbb{R}$

#3) $f(x) = \ln(x-1) - \ln(x+1)$

A) 1) Domain $x-1 > 0 \quad x > 1$ (2)

$x+1 > 0 \quad x > -1$ cond: $x > 1 \quad x \in]1; +\infty[$

2) $\lim_{x \to 1^+} \ln(x-1) - \ln(x+1) = -\infty - \ln 2$ (note $\ln 0^+ = -\infty$)

$= -\infty$ (1)

$\lim_{x \to +\infty} \ln\left(\frac{x-1}{x+1}\right) = \lim_{x \to +\infty} \ln\left(\frac{1}{1}\right)$

$= \ln 1 = 0$ (1)

3) $x = 1$ V.A (1) $\qquad y = 0$ H.A (1)

B) 1) $f'(x) = \frac{1}{x-1} - \frac{1}{x+1}$

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

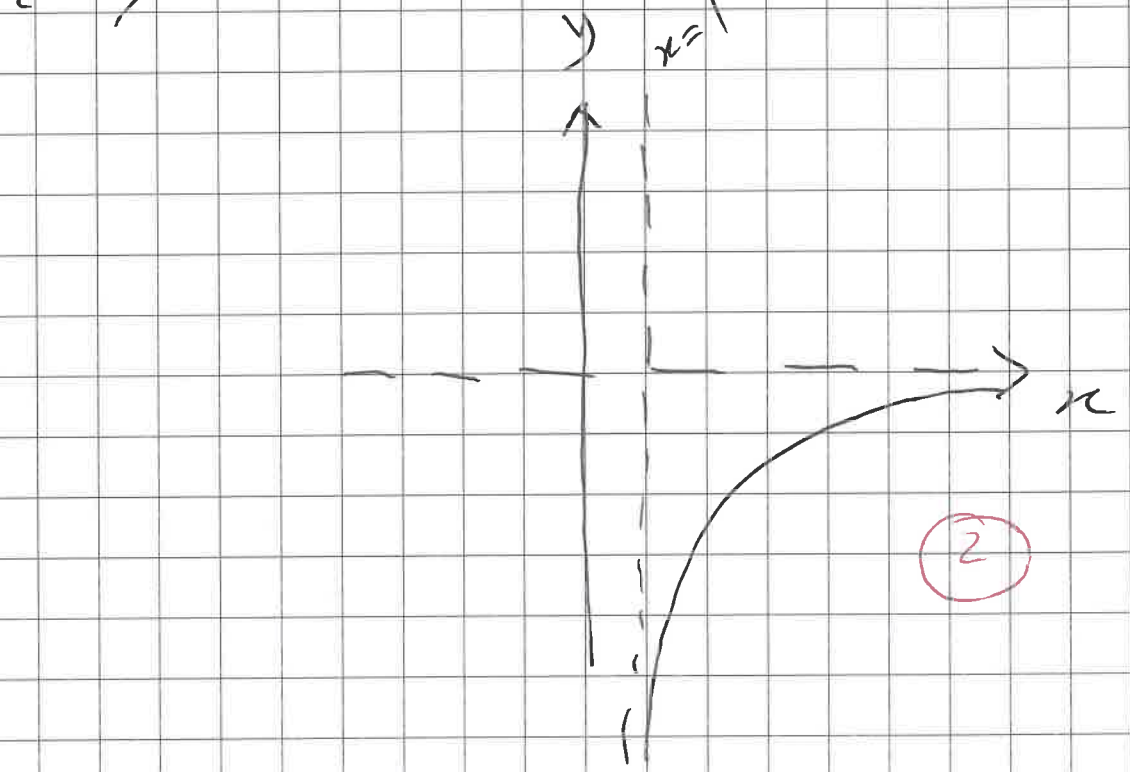
2) $f''(x) > 0$ since $x > 1$ (2)

3)

x	1		$+\infty$
y'	‖	$+$	
y	$-\infty$	↗	0

(2)

4)



(2)

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