This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loueizeh - Baabda

Stage Exam 02

08DEC2023

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

Subject :	Maths
Class :	12SE
Teacher :	Nicolas Kordahi
Duration :	1 hour

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.

1) Calculate the following limits: (4pts)
   a) $\lim\limits_{x\to+\infty} \frac{e^x-1}{e^x+1}$

   b) $\lim\limits_{x\to+\infty} \ln(\frac{x+6}{2x+2})$

2) (14pts)
   Consider the function f defined over [0,+∞[as $f(x) = 0.5e^x - e^{-x} + 1.5$
   a) Calculate f(0), f(1), f(2), and f(3).
   b) Determine $\lim\limits_{x\to+\infty} f(x)$
   c) Calculate f'(x) (derivative of f(x)
   d) Show that the function f(x) is strictly increasing over [0,+∞[
   e) Set up the table of variation of f(x).
   f) Draw the the graph of f(x).

3) (2pts)
   a) Simplify the following : $\ln(ae^2) - \ln(a) \quad a > 0$
   b) Calculate the derivative of $f(x) = \ln(2x^2 + 4)$

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1) a) $\lim_{x \to +\infty} \frac{e^x - 1}{e^x + 1} = \lim_{x \to +\infty} \frac{e^x}{e^x}$

$= 1$

2 pts

b) $\lim_{x \to +\infty} \ln\left(\frac{x+6}{2x+2}\right) = \lim_{x \to +\infty} \ln\left(\frac{1}{2}\right)$

$= \ln 1 - \ln 2$

$= 0 - \ln 2$

$= -\ln 2$

2 pts

2) $f(x) = 0.5e^x - e^{-x} + 1.5$ $\quad [0; +\infty[$

a) $f(0) = 0.5e^0 - e^{-0} + 1.5 = 1$

$f(1) = 0.5e^1 - e^{-1} + 1.5$

$= 0.5e - \frac{1}{e} + 1.5 = 2.48$

$f(2) = 0.5e^2 - e^{-2} + 1.5$

$= 4.77$

$f(3) = 0.5e^3 - e^{-3} + 1.5 = 11.25$

0.5 pts each

b) $\lim_{x \to +\infty} 0.5e^x - e^{-x} + 1.5 = +\infty - 0 + 1.5$

$= +\infty$

2 pts

c) $f'(x) = 0.5e^x + e^{-x}$

2 pts

d) $e^x > 0 \quad e^{-x} > 0$

then $0.5e^x + e^{-x} > 0$ then $y \nearrow$

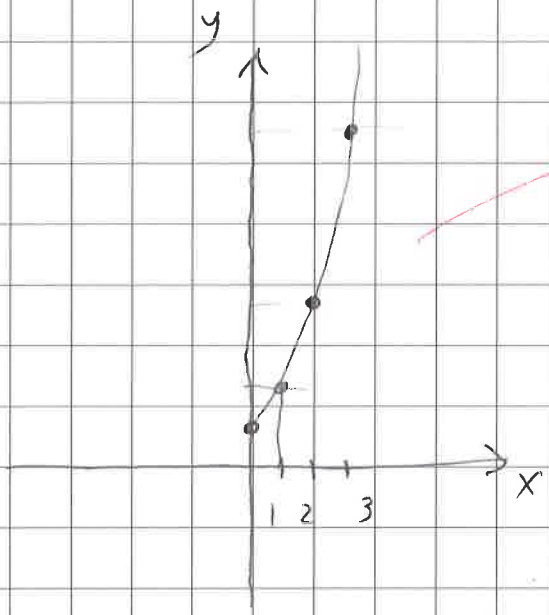
2 pts

e)

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

3 pts

b)



3 pts

3) a) $\ln ae^2 - \ln a = \ln a + \ln e^2 - \ln a$

$= 2 \ln e$

$= 2$

1 pt

b) $f(x) = \ln(2x^2+4)$

$f'(x) = \frac{u'}{u} = \frac{4x}{2x^2+4}$

$= \frac{2x}{x^2+2}$

1 pt