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 : | 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.

1) Given the following function f(x). (10pts).

$$f(x) = \frac{e}{\ln x}$$

(a) Write the domain of $f(x)$ in interval form.

(b) Calculate the derivative of $f(x)$.

(c) Set up the table of variations of the function $f(x)$.

2) Simplify the following: (5pts).

(a) $\ln\left(\frac{1}{\sqrt{e}}\right)$

(b) $(\ln(e^2))^9$

(c) $\ln(3e) + e^{\ln 3}$

(d) $\ln\left(\frac{e^2}{9}\right)$

3) Solve in $\mathbb{R}$ the following equations: (5pts).

(a) $\ln(3x - 5) = 0$

(b) $\ln(x) + \ln(x^3) = 0$

(c) $\ln(x^2) = 3$

(d) $\ln\left(\frac{1}{x}\right) = 4$

----------NK.

I- $f(x) = \frac{e}{\ln x}$

a) $\ln x \neq 0 \qquad x > 0$

$x \neq e^0$

$x \neq 1 \qquad x \in ]0;1[\cup]1;+\infty[$ → (3pts)

b) $f'(x) = \frac{u'v - v'u}{v^2}$

$= \frac{0 \cdot \ln x - \frac{1}{x} \cdot e}{(\ln x)^2}$ → (3pts)

$= \frac{-e/x}{(\ln x)^2} = \frac{-e}{x(\ln x)^2} < 0 \quad y \searrow$

c)

| $x$ | $0$ | | $1$ | | $+\infty$ |
|---|---|---|---|---|---|
| $y'$ | ‖ | $-$ | ‖ | $-$ | |
| $y$ | ‖ $0^-$ | $\searrow$ | ‖ $-\infty$ ‖ $+\infty$ | $\searrow$ | $0$ |

$(0^+;0)$

$f(0^+) = 0^-$

→ (4pts)

II- a) $\ln 1/\sqrt{e} = \ln 1 - \ln\sqrt{e}$

$= 0 - \frac{1}{2}\ln e$

$= -\frac{1}{2}$ → (1pt)

b) $(\ln e^2)^9 = (2\ln e)^9$

$= 2^9$ → (1pt)

c) $\ln 3e + e^{\ln 3} = \ln 3 + \ln e + 3$

$= \ln 3 + 4$ → 1pt

d) $\ln\left(\frac{e^2}{9}\right) = \ln e^2 - \ln 9$

$= 2\ln e - 2\ln 3$

$= 2 - 2\ln 3$ → 1pt

III- a) $\ln(3x-5) = 0$

$3x - 5 = e^0$

$3x - 5 = 1$

$3x = 6$

$x = 2$ → 1pt

b) $\ln x + \ln x^3 = \ln 3 + 3\ln x = 0$

$= 4\ln x = 0$

$\ln x = 0$

$x = e^0$

$x = 1$ → 1pt

c) $\ln(x^2) = 3$ $x^2 = e^3$ $x = \pm\sqrt{e^3}$ → 1pt

d) $\ln 1/x = 4$ $\ln 1 - \ln x = 4$

$0 - \ln x = 4$

$\ln x = -4$

$x = e^{-4}$ → 1pt

+2 points if all.

NKS