

Doha High School

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Where Education Has a Future

Academic year 2022-2023

Class: G12 LS	Mathematics Duration: 60 min		nin	
Name:	Monthly Exam	Total: /	20	Date:9-11-2022

I-(1.5 points)

Determine the domain of definition of the following function: $f(x) = \frac{\ln(x-2)}{x-3}$

II-(5 points)

Solve the following equations and inequality:

1)
$$\ln x + \ln 2 = \ln(x+1) - 2\ln 3$$

2)
$$\ln^2 x + 3\ln x = 4$$

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 3) $\ln(3x-1) - \ln(-x+1) \le \ln 2$

III-(4.5 points)

Calculate the following integrals:

$$1) \int_{1}^{2} \frac{-x+2}{x^2-4x+5} dx$$

$$2) \int_{0}^{1} \frac{x^2 - 1}{\left(x^3 - 3x + 3\right)^3} dx$$

1)
$$\int_{1}^{2} \frac{-x+2}{x^2-4x+5} dx$$
 2) $\int_{0}^{1} \frac{x^2-1}{\left(x^3-3x+3\right)^3} dx$ 3) $\int_{1}^{e} \left(2x-1-\frac{\ln x}{x}\right) dx$

IV-(4.5 points)

Calculate the following limits:

1)
$$\lim_{x \to +\infty} \frac{x + 2\ln x}{x}$$

$$2) \lim_{x \to +\infty} \left(2x - 1 - \ln^2 x \right)$$

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$$\lim_{x \to +\infty} \frac{x + 2\ln x}{x}$$
 2)
$$\lim_{x \to +\infty} \left(2x - 1 - \ln^2 x\right)$$
 3)
$$\lim_{x \to 3} \frac{\int_{-\infty}^{\infty} \ln(t + e - 3)dt}{\ln(2x - 5)}$$

V-(4.5 points)

Consider the function f defined over IR by: $f(x) = x^2 - 1$, and let (C) be its representative curve.

- 1) Set up the table of variations of f.
- 2) Solve the equation f(x) = 0 and draw (C).
- 3) Calculate the area of the domain limited by (C), the axis of abscissas and the lines with equations x = -1 and x = 1.
- 4) Calculate the area of the domain limited by (C), the axis of abscissas, the axis of ordinates and the line with equation x = 2.