MIDTERM EXAMINATION

Semester 1, 2021-22 • Duration: 75 minutes

SUBJECT: ANALYSIS 2	
Department of Mathematics Chair: Prof. Pham Huu Anh Ngoc	Lecturer Nguyen Anh Tu

INSTRUCTIONS:

- This is an OPEN BOOK exam.
- Calculators are allowed.

1. (20 points) Find a function F such that $F'(x) = |x^2 - 3x + 2|$ for all $x \in \mathbb{R}$.

2. (20 points) Find

$$\int \frac{x^2 + x + 3}{(4x^2 + 1)(x - 1)^2} dx$$

3. (20 points) a/ Show that

$$\int_2^\infty \frac{dx}{\ln x}$$

diverges.

b/ Let $f(x) = \int_2^x \frac{dt}{\ln t}$. Find

$$\lim_{x \to \infty} \frac{f(x)}{x/\ln x}.$$

4. (20 points) Determine whether the following integral converges or diverges

$$\int_0^\infty \frac{\sin(1/x)}{\sqrt{x}} dx.$$

5. (20 points) Let R be the region bounded by the parabola $x = -y^2 + 2y + 3$ and the line $x + y = 3$. Let V be the solid obtained by rotating R about the x-axis. Find the volume of V.

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