

2021 IUT Admission Test(SOCIE, Scholarship)

Math Examination

<Essay Types> Applicants should write detailed solving process. If there is no solution, you will receive 0 points regardless of the correct answer.

○ The point for each question is indicated next to each question number.

1. [10 points]

When $\alpha^2 = 4 + \sqrt{12}$ and $\beta^2 = 4 - \sqrt{12}$, find $\alpha^3 + \beta^3$, where $\alpha > 0$ and $\beta > 0$.

2. [10 points]

Evaluate $\operatorname{tg} \frac{3\pi}{10} \operatorname{tg} \frac{6\pi}{5}$.

3. [10 points]

Evaluate $\lim_{x \rightarrow 1} \frac{-2 + \sqrt{5-x}}{-1 + \sqrt{2-x}}$.

4. [20 points]

Find the maximum and minimum values of $f(x) = x^3 - 6x^2 + 9x + 4$ for $0 \leq x \leq 5$.



[20 points]

Evaluate $\int_0^\pi x^2 \sin x \, dx$.



[30 points]

Find the volume of the solid obtained by rotating the region enclosed by $y = x^2$ and $y = \sqrt{8x}$ about the x -axis.