2020 IUT Admission Test(SOL)

Math Examination(Sample)

<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]
Let $\{a_n\}$ be a sequence of numbers such that $a_1 = 1$ and $a_{n+1} = \dfrac{1}{a_n + 1}$ for every integer $n \geq 1$. Find a_5.

2. [10 points]
Suppose $a > 0$. Find the minimum value of $\left(a + \dfrac{3}{a}\right)\left(3a + \dfrac{1}{a}\right)$.

3. [10 points]
Find the number of real solutions of $x + 5\cos x = 0$.

4. [20 points]
Let ω be a solution of $x^2 - x - 1 = 0$. Compute $\omega^5 - 5\omega$.

5. [20 points]
Let ℓ be a tangent line to the curve $y = 2x^2 - 3x$ passing through $(2, 0)$. Find the least slope of such ℓ.

6. [30 points]
Find the largest integer which is not exceeding the following limit

$$\lim_{n\to\infty}\left(\frac{3^{\frac{1}{n}} + 4^{\frac{1}{n}}}{2}\right)^n.$$