MATH6353.03 Analysis II

Instructor: Kenichi Maruno

Name:

1. Do you know countable and uncountable sets? The real numbers $\mathbb{R}$ is countable? The rational numbers $\mathbb{Q}$ is countable?

2. Do you know "$\operatorname{lub} X$"(or "$\sup X$") and "$\operatorname{glb} X$"(or "$\inf X$")?

3. Do you understand the following rigorous definition of limit?
   For a sequence: "We say that a sequence $\{a_n\}_{n=1}^{\infty}$ ($a_n \in \mathbb{R}$) has a limit $L \in \mathbb{R}$ if for every $\epsilon > 0$, there exists a positive integer N such that $|a_n - L| < \epsilon$ whenever $n \geq N$."
   For a function: "We say that the limit of a function $f(x)$ as x approaches a is L if for every $\epsilon > 0$, there exists $\delta > 0$ such that $|f(x) - L| < \epsilon$ whenever $0 < |x - a| < \delta$."

4. Do you know the squeeze theorem?

5. Do you know what the definition of absolute convergence is?

6. Do you know what a Cauchy sequence is?

7. Do you know what the definition of uniform convergence is?

8. Do you know the triangle inequality?
   $$|a - c| \leq |a - b| + |b - c| .$$

9. Do you know "metric space", "compact metric space", and "complete metric space"?

10. Do you know how to compute integrals? If yes, please compute
    $$\int_0^1 x^3 dx$$

11. Have you ever taken Calculus I, Calculus II, and Calculus III courses for undergraduate?

12. Have you ever taken a class of real analysis for undergraduate?

13. Have you ever taken math courses about Fourier series?