

Ve 216: Introduction to Signals and Systems Quiz

Yong Long

The University of Michigan- Shanghai Jiao Tong University Joint Institute
Shanghai Jiao Tong University

Quiz 1

16:00-16:45

Quiz Rules (1)

- Your entire face must be visible at all times throughout the duration of the quiz.
- Each study group completes the quiz problems collaboratively and submits **one** solution set.
- **Any** writing after the time is up is an honor code violation. Write **your group number, names and IDs before** starting the quiz so that you can stop writing immediately when the time is up.
- Submit your quiz solutions as a **pdf** file to Canvas by **16:55**. The Canvas submission will be **closed at 16:55 sharp**.
- In the unlikely event of a technical problem with Canvas, email your solutions to me (yong.long@sjtu.edu.cn) by the deadline, and then **later upload when the system is working**.

Quiz Rules (2)

- Your attendance will be taken at 16:10, 16:30, 16:45.
 - If you are not in the ZOOM meeting list by 16:10, your quiz score will be reduced by 30%.
 - If you are not in the ZOOM meeting list by 16:30, your quiz score will be reduced by 80%.
 - If you are not in the ZOOM meeting list by 16:45, your quiz score will be reduced by 100%.

Quiz Rules (2)

- Problems where the number of points are followed by an exclamation point are basic skill problems and will be graded without partial credit.
- Clearly box your final answer. You will be graded on both the final answer and the steps leading to it. Correct intermediate steps will help earn partial credit.
For full credit, ~~cross-out~~ any incorrect intermediate steps.
Simplify your answers as much as possible.
- If you need to make any additional assumptions, state them clearly.
- Legible writing will help when it comes to partial credit.

Example (10!)

Consider the following CT system with input $x(t)$ and output $y(t)$

$$y(t) = x(\sin(t)) + \int_1^3 e^{-\tau^2} x(t - \tau) d\tau.$$

- Prove that it is linear or give a counter example. [2!]
- Prove that it is time-invariant or give a counter example. [2!]
- Determine whether it is causal or noncausal. [2!]
- Determine if it is a memoryless or memory system. [2!]
- Determine if it is BIBO stable or unstable? [2!]

Example (10!)

Consider the following CT system with input $x(t)$ and output $y(t)$

$$y(t) = \left(\int_{t-T}^t x(\tau) d\tau \right) * u(t), \quad T > 0.$$

- Prove that it is linear or give a counter example. [2!]
- Prove that it is time-invariant or give a counter example. [2!]
- Determine whether it is causal or noncausal. [2!]
- Determine if it is a memoryless or memory system. [2!]
- Determine if it is BIBO stable or unstable? [2!]