

Coding #01: Signals and Systems

2025/9/3

6.53/10 Points

Attempt 1



Review Feedback

2025/9/2

Attempt 1 Score:

6.53/10

View Feedback

Anonymous Grading: **no****Unlimited Attempts Allowed**

2025/8/22 to 2025/9/10

▼ Details



Case File #1: *The Disappearing Signal*

Problem 1: Identifying the Source

Agents, we've intercepted a mysterious transmission. The signal is faint, partially buried in time, and seems to carry an unusual phase structure. Headquarters has recovered the recording for you, and you may retrieve it with the command:

```
[x, fs] = get_recording('#####'); % Replace with your UFID
```

The intercepted transmission was generated from one of four possible source types:

Type 1 — cosine with exponential rise:

$$x(t) = A \cos(2\pi f_c t)(1 + e^{+0.5\pi t})u(t)$$

Type 2 — sine with exponential rise:

$$x(t) = A \sin(2\pi f_c t)(1 + e^{+0.5\pi t})u(t)$$

Type 3 — cosine with exponential decay:

$$x(t) = A \cos(2\pi f_c t)e^{-9\pi t}u(t)$$

Type 4 — sine with exponential decay:

$$x(t) = A \sin(2\pi f_c t)e^{-9\pi t}u(t)$$

Your mission is to **reverse-engineer the source parameters** from the raw signal:

- **type** — which of the four possible waveforms was used (1, 2, 3, or 4)
- **A** — the amplitude.
- **fc** — the center frequency (Hertz).
- **t0** — the time delay (seconds).

Once you've decoded the transmission, you must also reconstruct the **response signal** : the same as what you observed, but

shifted in phase by **+90 degrees**. You may reconstruct this with or without the time delay.

Required Tools

get_recording function: [get_recording.p](#)

(<https://ufl.instructure.com/courses/540008/files/99432393?wrap=1>)



(https://ufl.instructure.com/courses/540008/files/99432393/download?download_frd=1)

Submission Instructions

Prepare a `.mat` file containing the following variables:

- `type`
- `A`
- `fc`
- `t0`
- `y`

For uniformity, save your results as:

```
save('case1_problem1.mat', 'type', 'A', 'fc', 't0', 'y')
```

Upload this file as your official report to Headquarters. Your accuracy will determine whether we can trace the origin of this mysterious broadcast.

Problem 2: Probing the Black Box

Agents, the intercepted transmission has led us to an unknown device. Its behavior is shrouded in mystery. Headquarters has provided you a way to safely probe the system:

```
y = probe_system('#####', x); % Replace ##### with your UFID
```

This function allows you to feed an input signal into the black box and observe the corresponding output . Beyond this, nothing about the system's structure is revealed—you must deduce its nature through careful experimentation.

Your mission: determine the fundamental properties of this system. Each property can only take one of two values:

- **Linearity** ()
 - → Not linear
 - → Linear
- **Time-Invariance** ()
 - → Not time-invariant
 - → Time-invariant
- **Causality** ()
 - → Not causal (depends on future inputs)
 - → Causal (depends only on present/past inputs)
- **Memory** ()
 - → Has memory (output depends on past inputs)

- 1 → Memoryless (output depends only on current input)

Required Tools

probe_system function: [probe_system.p](#)

(<https://ufl.instructure.com/courses/540008/files/99428807?wrap=1>)



(https://ufl.instructure.com/courses/540008/files/99428807/download?download_frd=1)

Submission Instructions



Prepare a `.mat` file containing the following variables:



- `linear_type`
- `timeiv_type`
- `causal_type`
- `memoryless_type`

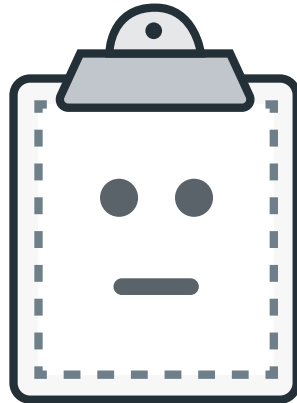
Save your report in the standard format:

```
save('case1_problem2.mat', 'linear_type', 'timeiv_type', 'causal_type', 'memoryless_type')
```

Your success depends on correctly classifying the system's behavior. Probe wisely—each clue in the input-output relationship may reveal the device's true nature.

File Name		Size	
	case1_problem2.mat	349 Bytes	

	File Name	Size	
	case1_problem1.mat	508 KB	



Preview Unavailable

case1_problem2.mat



[Download](#)

[https://ufl.instructure.com/files/99645310/download?
download_frd=1&verifier=kqWpyYibIS0oS08EKBIZa5Zflb66nKOfZGUPA](https://ufl.instructure.com/files/99645310/download?download_frd=1&verifier=kqWpyYibIS0oS08EKBIZa5Zflb66nKOfZGUPA)

New Attempt