

Time variant and time-invariant system

8.01.2021

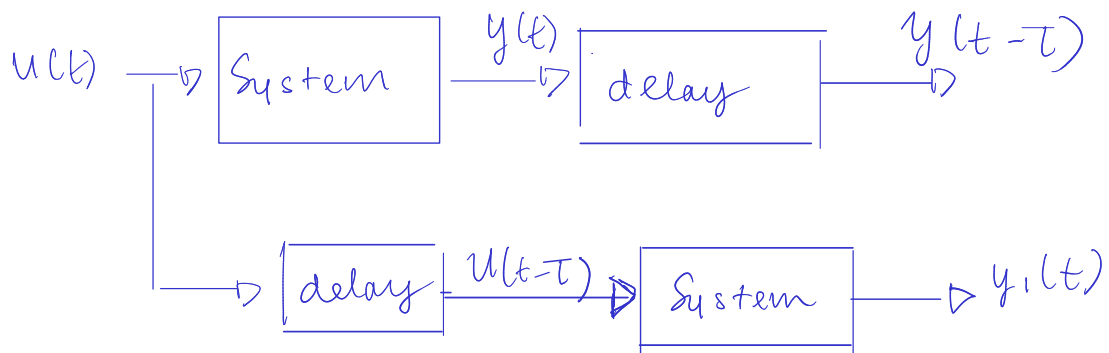
Let's try with MATLAB Simulink to test if a system is time-variant or time-invariant.

Basically, we will do two kinds of simulation:

① with the **output** delayed by τ

② with the **input** delayed by τ

We will then compare the results from those two simulations.

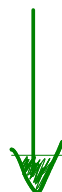
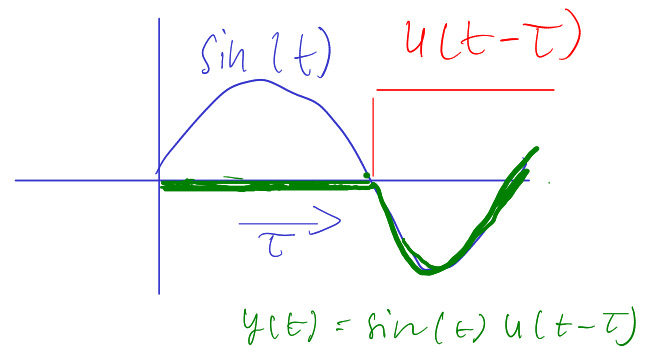
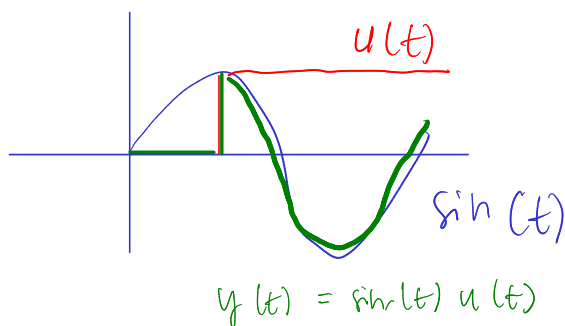


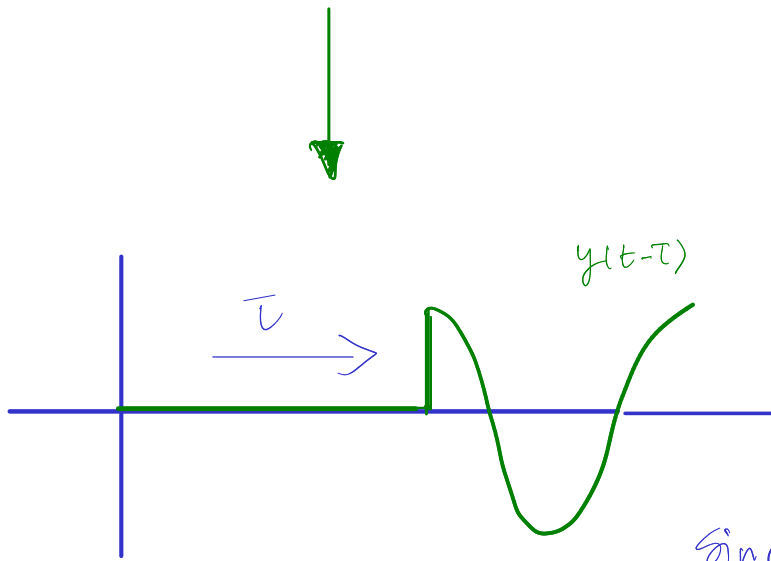
The system is time-invariant when:

$y(t - \tau) = y_1(t)$, otherwise, it is time-variant

①

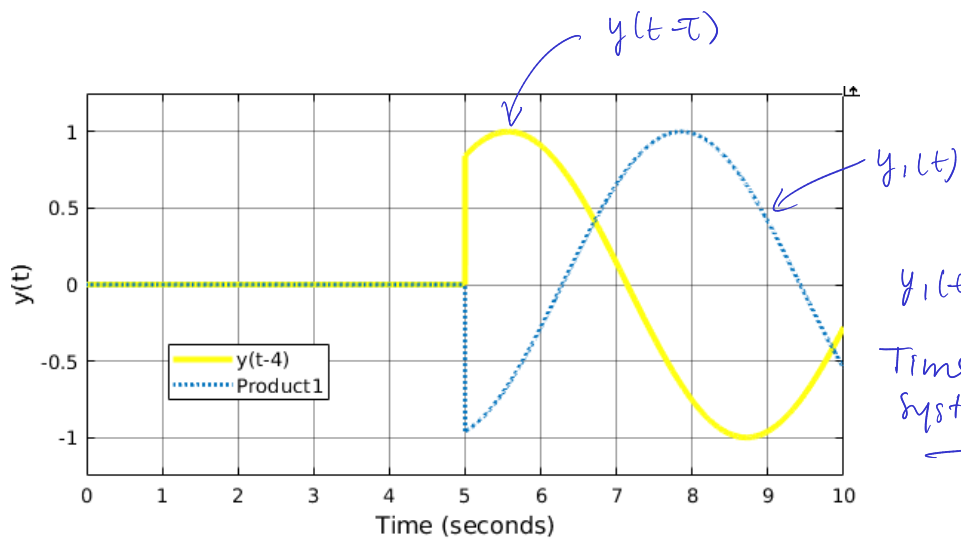
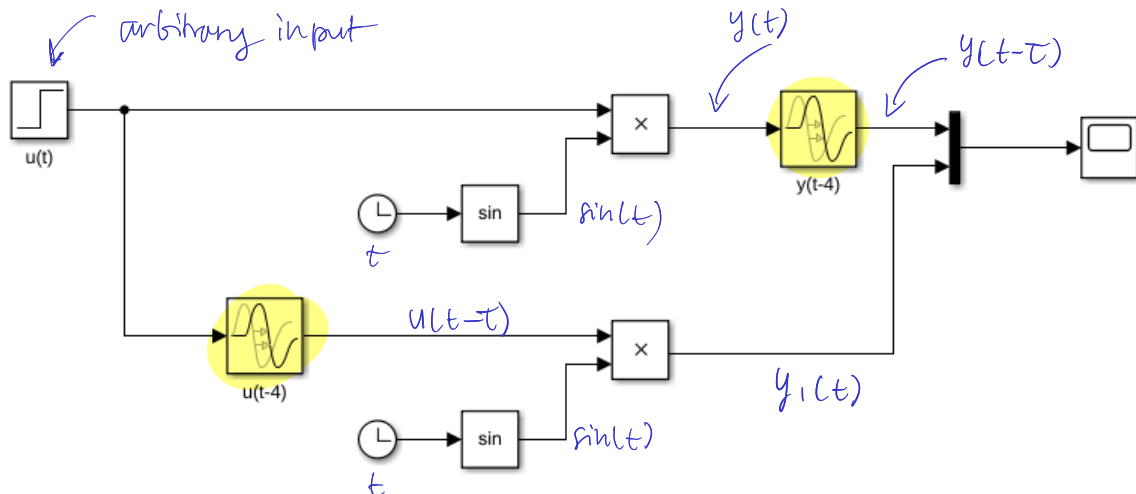
output $y(t) = \sin(t)$ input $u(t)$





Since $y(t-\tau) \neq y_1(t)$
it is a time variant system

now, let's try with MATLAB Simulink:

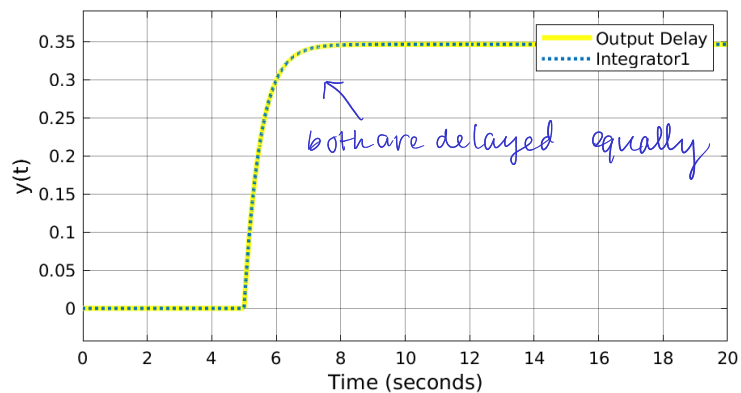
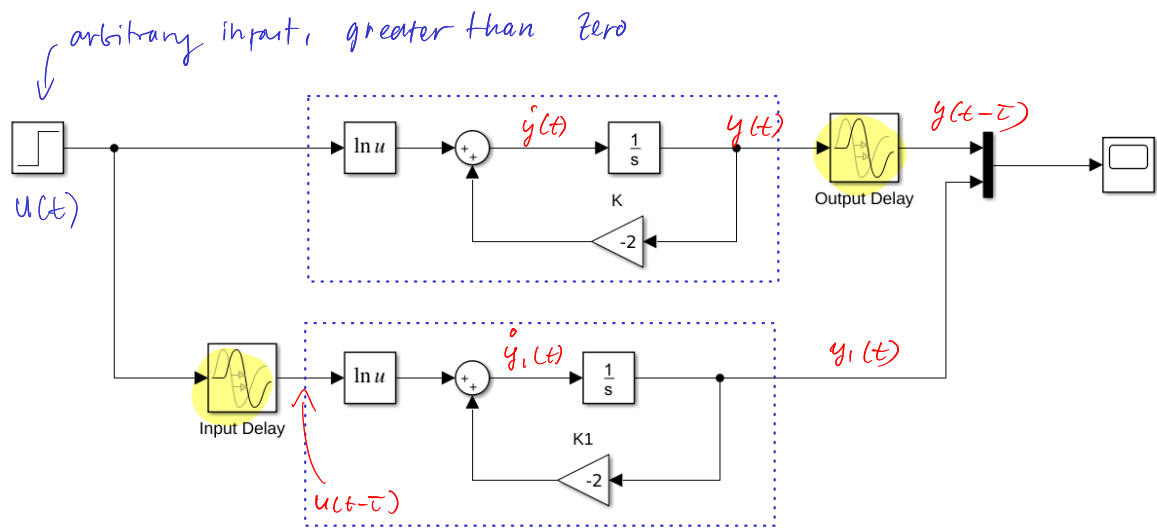


$y_1(t) \neq y(t-\tau)$
Time-Variant System

2

Is the system below a time-variant or a time invariant system?

$$\dot{y}(t) + ky(t) = \ln(u(t)) \quad , \quad \underline{u(t) > 0}$$



$$y(t-T) = y_1(t) \Rightarrow \text{time invariant}$$