RC2017 Signals and Systems **Homework 5**
Assign: Thu 21 Feb 2019 **Due for RC2: Wed 27 Feb 2019**

Instruction: Hand in your work with name and code to my desk by 10.00 am. of the due date. DO NOT copy homework from your classmates or lend it to others. Anyone who violates this regulation will be given -10 for the homework.

1. An LTIC system is specified by the block diagram in Fig. 1 For each input $f(t)$ and

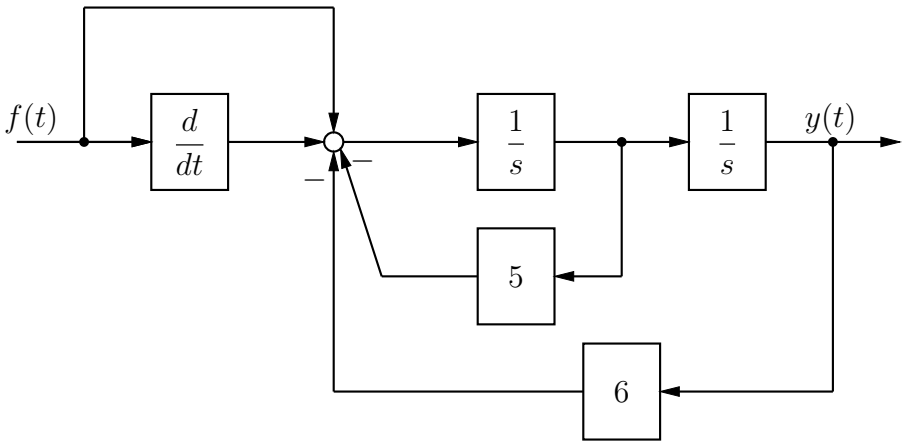


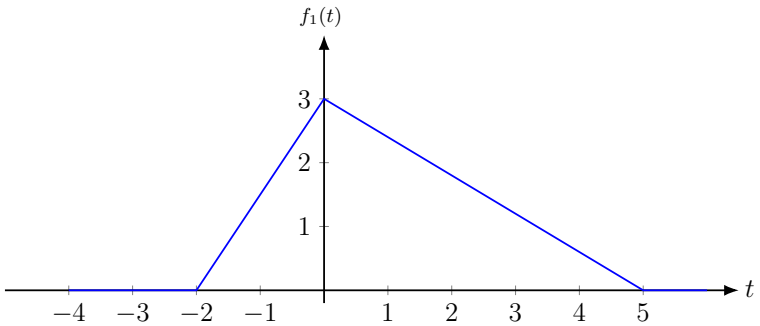
Figure 1: a block diagram of the LTIC system.

the initial values listed below, find zero-input , zero-state and total responses of the system.

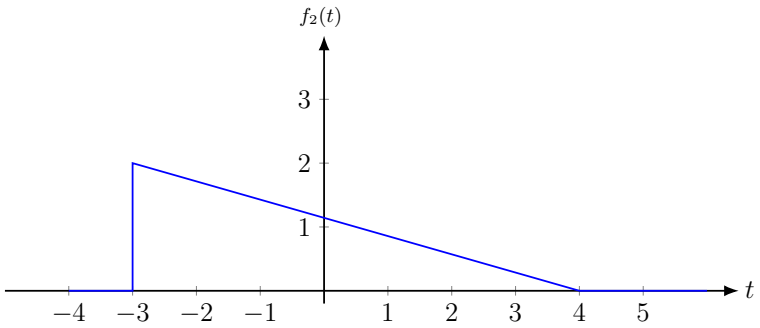
a. $f(t) = 6t^2$, $y(0) = 2$ and $\dot{y}(0) = -1$. (5 points)

b. $f(t) = 4e^{-4t}$, $y(0) = 2$ and $\dot{y}(0) = -1$. (5 points)

2. Determine the convolution $c(t) = f_1(t) * f_2(t)$, where $f_1(t)$ and $f_2(t)$ are shown in Figure 2



(a)



(b)

Figure 2: Question 2

3. The circuit shown in Figure 3 has been in the configuration shown (with the switch open) for a long time. At $t = 0$ the switch closes. (a) Find $v_C(0^+)$ and $\dot{v}_C(0^+)$. (b) Find the total response $v_C(t)$ for all t.

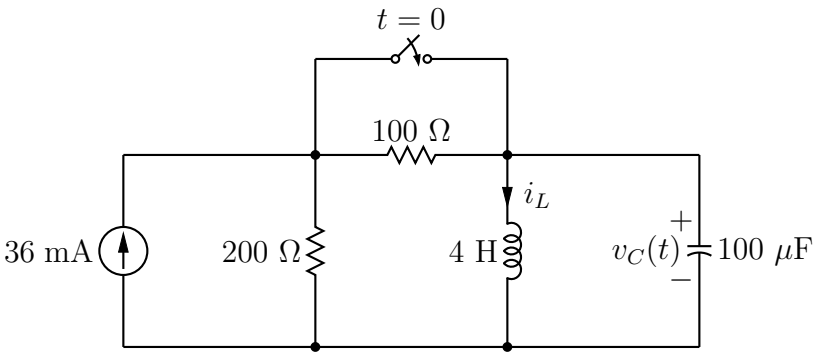


Figure 3: Question 3