RC2017 Signals and Systems **Homework 3**
Assign: Thu 7 Feb 2019 **Due for All: Wed 13 Feb 2019**

Instruction: Hand in your work with name and code in the mail box labeled INC211 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.

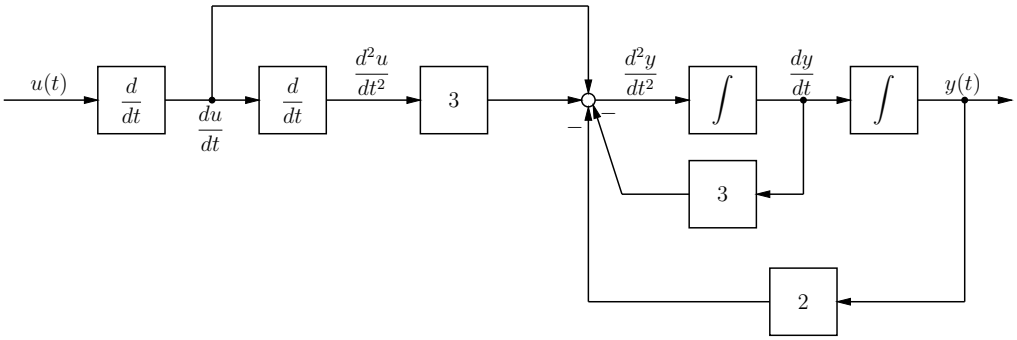
1. Draw a block-diagram of a system

$$\frac{dy}{dt} + 3y(t) + 2\int_{-\infty}^{t} y(\tau)d\tau = 3\frac{du}{dt} + u(t).$$

(5 points)
Solution:
The ODE of above system is

$$\frac{d^2y}{dt^2} + 3\frac{dy}{dt} + 2y(t) = 3\frac{d^2u}{dt^2} + \frac{du}{dt}.$$

Then a block diagram of the system is shown below:



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2. The continuous-time system shown in Fig.1 consists of two integrators and two scalar multipliers. Write a differential equation that relates the output $y(t)$ and the input $u(t)$. (5 points)
Solution:

$$\frac{d^2y}{dt^2} + a_1\frac{dy}{dt} + a_2y(t) = u(t)$$

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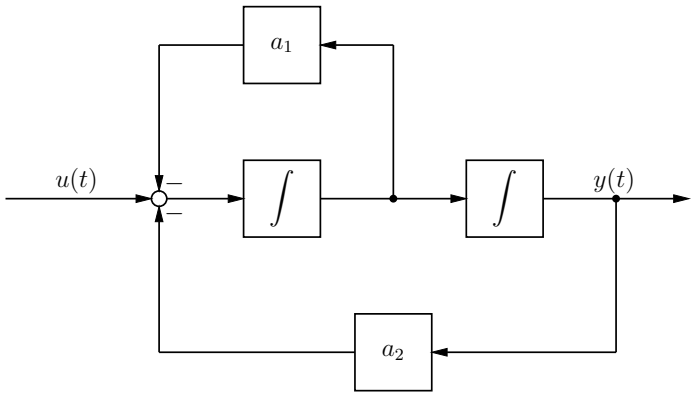

Figure 1: For question 2