

Student's name:

Student's ID:

PRINCIPLES OF EE2

Spring 2020

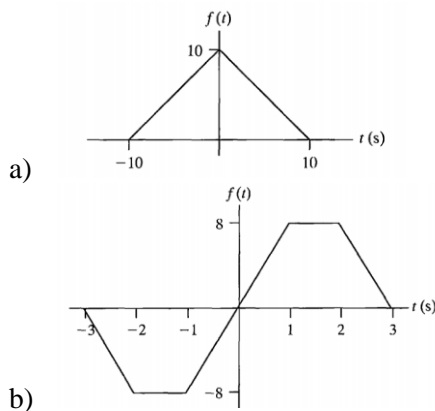
Homework #2

Deadline: 20/03/2020

NOTE:

- While doing your homework, explain your work in detail
- Submit the homework via Blackboard, the name of the PDF file should follow the format: **HovaTen_MSSSV_HW#2**.
- You can do your HW either by **typing equation in Word** or **hand written papers**. Then, **before submitting, convert them into PDF format** so that your work arrangement will remain the same the way you represent it.
- **Hand written works** should **not be captured by camera only**, as it will be hard for me to see your work if the image quality is low. Using CamScanner App on mobile phone to scan your Paper is recommended if you do not possess scanner machine.
- Any **late submission** will be **subtracted by 20% per day**. Copying your classmate homework is prohibited. If caught with evidences, violation cases will result in 0 in the marks from both parties, respectively.

Problem 1 (25 marks): Use unit step function to write the expression for each of the functions shown in below figures:

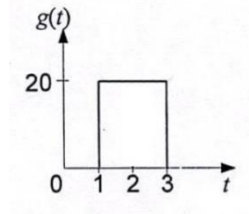


Problem 2 (25 marks):

- a) Find Laplace transform $\mathcal{L} \left\{ \frac{d}{dt} \sin(\omega t) \right\}$
- b) Find Laplace transform $\mathcal{L} \left\{ \frac{d}{dt} \cos(\omega t) \right\}$
- c) Find Laplace transform $\mathcal{L} \left\{ \frac{d^3}{dt^3} t^2 u(t) \right\}$
- d) Double check the result of question (a), (b), and (c) by first differentiating before transforming

Problem 3 (25 marks): Find the Laplace transform for each of the following functions:

- a) $f(t) = te^{-at}$
- b) $f(t) = \sin(\omega t + \theta)$
- c) The function in the shown figure



- d) $f(t) = (5t - 10)[u(t - 2) - u(t - 4)] + (50 - 10t)[u(t - 4) - u(t - 8)] + (5t - 70)[u(t - 8) - u(t - 14)]$

Problem 4 (25 marks): Find the Laplace transform for each of the following functions:

- a) $f(t) = \frac{d}{dt}(e^{-at} \sin(\omega t))$
- b) $f(t) = \int_0^t e^{-at} \cos(\omega t) dt$
- c) Verify the results obtained in (a) and (b) by first calculating the given functions, then computing their Laplace transform of the obtained results, respectively.