



DUE DATE: MAY 12, 2019 BY 5:00 AM

It is required to use Matlab, or any other programming tool, to perform the following tasks. You can use the built in functions as well as the three attached functions; "ustep.m", "rect.m" and "triangl.m"

Description

1) Part A

- a) Read the three functions; "ustep.m", "rect.m" and "triangl.m" to understand what they define.
- b) Plot the output of each of the three functions for $-5 \leq t \leq 5$.
- c) Re-define a Triangular function, $r(t)$, with base extending from -3 to 3 , and a height of 2 .
Plot the output of your function for $-5 \leq t \leq 5$.
- d) Using the available functions, define and plot the following function for $-4 \leq t \leq 3$

$$x(t) = e^{-3t} \sin(8\pi t/5) u(t + 2)$$

2) Part B

- a) Generate the following function

$$y(t) = e^{-|t|/5} [u(t + 1) - u(t - 3)]$$

- b) Generate the following signal, defined in terms of $y(t)$

$$y_1(t) = y(3t), y_2(t) = y(t + 2), y_3(t) = y(4t - 2),$$

- c) Use "subplot(.)" to plot $y(t), y_1(t), y_2(t), y_3(t)$ in a 2×2 figure

3) Part C

- a) Define the following periodic signal and plot it in the range of $-15 \leq t \leq 15$

$$z(t) = e^{-|t|/3} \sin(4\pi t) [u(t) - u(t - 5)], \text{ Periodic with } T = 6$$

- b) Evaluate and report the Energy and the Power of $z(t)$.

4) Part D

- a) Using built in functions, or otherwise, find the Fourier series coefficients of the following periodic signal

$$h(t) = \begin{cases} 1 - 2|t| & |t| \leq 0.5 \\ 0 & \text{otherwise} \end{cases} \quad \text{Periodic with } T = 6$$

- b) Plot the magnitude and the phase of the FS coefficients obtained in the previous step.

5) Part E

- a) Using built in functions, or otherwise, find and plot the Fourier transform of the following signal

$$m(t) = \frac{\sin(5\pi t)}{\pi t}$$

- b) Find and plot the following signal, as well as its Fourier transform

$$r(t) = m(t) \cos(30\pi t)$$

- c) Comment on the relation between $R(j\omega)$ and $M(j\omega)$



Deliverables

Deliver the following in printed format

- 1) Source codes (.m files) of each of the 5 parts
- 2) Figures requested by each part. Label your figures properly
- 3) Required values to report from Part C-b
- 4) Your comments on Part E-c

Deliver, electronically, the following in a .zip file

- 1) Source codes (.m files) of each of the 5 parts
- 2) Figure in .fig format
- 3) A complete .pdf report

Instructions

- 1) This is an **Individual** project.
- 2) Individual reports are not to be shared with others.
- 3) Any copied reports, either fully or partially, will receive 0 points. This applies to both the original and the copy.
- 4) Late submission will be penalized at the rate of 15% per day for a maximum of 2 days, after which no submissions will be considered.
- 5) Project files are to be sent by **email** as a single .zip attachment, with email subject "**ELC 225B Project - <yourname>**".
to maiengineer@hotmail.com and cc: michaelmelek.projects@gmail.com

Functions

```
function y=rect(t)
y = ( sign(t+0.5) - sign(t-0.5) >0);
end
```

```
function y=triangl(t)
y = (1-abs(t)) .* (t>=-1) .* (t<1);
end
```

```
function y=ustep(t)
y = (t>=0);
end
```