Date Due:Bahman 28, 1391

Homework 1 (Introduction to MATLAB)

Please refer to the course syllabus for the full homework policy and options.

Reminders

- Collaboration is permitted, but you must write the solutions *by yourself without assistance*, and be ready to explain them orally to a member of the course staff if asked. You must also identify your collaborators. Getting solutions from outside sources such as the Web or students not enrolled in the class is strictly forbidden.

- Course policy for late submission is as below:
  * 10% of the whole point as penalty for each day delay up to three days after the deadline.
  * 25% of the whole point for delivery up to one week after the deadline.
  * Do not even think of submission after more than one week delay!

Problems

1. Read the MATLAB introduction tutorial. Get acquainted with the Signal Processing toolbox of MATLAB. Plot the following functions in MATLAB(j is the complex operator):

   a. $x_1(t) = cos(2\pi t^2 + \frac{3\pi}{4})$

   b. $x_2(t) = u(t+1) - u(t-1)$

   c. $x_3(t) = \sum_{j=-3}^{3} \sum_{k=-4}^{4} x_2(t+10kj)$

   d. $x_4(t) = \frac{sin(\pi t)}{\pi t}$

   e. $x_5(t) = sin(\frac{t}{3}).cos(\frac{t}{4} - \frac{2\pi}{3})$

   f. $x_6(t) = (e^{2jt} - e^{-jt})^3.sin(\frac{t}{3})^2$

2. Review on complex numbers:

   a. Write each number in polar form ($re^{j\theta}$, with $-\pi < \theta \leq \pi$): $(j+\sqrt{3})^5$, $\frac{cos(2.5\theta)+jsin(1.5\theta)}{e^{j\theta}}$, $\frac{2-j(\frac{6}{\sqrt{3}})}{2+j(\frac{6}{\sqrt{3}})}$.

   b. Write each number in Cartesian form ($x + jy$): $\sqrt{2}e^{-j\pi/4}$, $\frac{1}{1+e^{j\theta}}$

   c. Find the solutions of $z_1^4 = 2 - j\sqrt{2}$ and $z_2^3 = 3 + \sqrt{8}j$. Then plot them in MATLAB.

3. Consider the signal $x(t)$ depicted in figure P1.31.c on p. 63 of the text book. Sketch and carefully label the following signals.

   a. $x(-3t - 1)$

   b. $x(t)[\delta(t + \frac{3}{2}) + u(t - 2)]$

   c. $[x(t) + x(-t)]u(t + 1)$

4. Consider the signal $x[n]$ depicted in figure P1.24.d on p. 63 of the text book. Sketch and carefully label the following signals.

   a. $x[(n+2)^2]$

   b. $x[-3n]$

   c. $x[3-n]u[n]$