EE 3054: Signals, Systems, and Transforms
MATLAB Quiz 1 — Spring 2011

No laptop, no notes, no documentation.

Some MATLAB commands on this quiz may produce errors. For those cases, please state that.

1. Given the following array $a$,

\[
\begin{array}{cccc}
5 & 7 & 0 & 3 \\
3 & 2 & 4 & 4 \\
1 & 6 & 2 & 7 \\
\end{array}
\]

determine the result of each of the following commands.

\[
\begin{align*}
& \gg a(0, 3) \\
& \gg a(2, 1) \\
& \gg a(:, 2) \\
& \gg a(5) \\
& \gg a(\text{end}) \\
& \gg a([1 3], 1:3) \\
& \gg a([2 1], 1:3) \\
& \gg a(\text{end}, [2 4]) \\
& \gg a(3:-1:1, 1:2:4) \\
& \gg a(1:2:end, 1:2:end) \\
& \gg a(\text{end}, :) \\
& \gg \text{max}(a) \\
& \gg \text{max}(a(:)) \\
& \gg b = a; b(2,:) = [] ; b
\end{align*}
\]

2. Given the following vector $a$,

\[
a = \\
\begin{array}{cccc}
8 & 6 & 7 & 3 \\
5 &
\end{array}
\]
determine the result of each of the following commands.

\[
\begin{align*}
& \gg a(1,3) \\
& \gg a(3,1) \\
& \gg a' \\
& \gg a \ast a \\
& \gg a .* a \\
& \gg a.^2 \\
& \gg [a; a] \\
& \gg [M, k] = \text{min}(a) \\
& \gg a > 5 \\
& \gg \text{find}(a > 5) \\
& \gg a(\text{find}(a > 5))
\end{align*}
\]

3. Sketch each graph produced by the following code fragment. Indicate the horizontal coordinates in your sketch.

\[
\begin{align*}
& \gg n = [-4 -2 0 2 4 6]; \\
& \gg x = [3 4 5 2 1 3]; \\
& \gg \text{plot}(x,'o') \\
& \gg \text{plot}(x) \\
& \gg \text{plot}(n,x,'o') \\
& \gg \text{plot}(n,x) \\
& \gg \text{plot}(n,x,n,x,'o')
\end{align*}
\]
4. Write a MATLAB function called `myprog.m` that has two inputs and one output. The function should simulate the system

\[
y(n) = \begin{cases} 
  x(n), & \text{if } |x(n)| \leq A \\
  A, & \text{if } x(n) > A \\
  -A, & \text{if } x(n) < -A 
\end{cases}
\]

The inputs to your function should be \(x\) and \(A\). The output of your function should be \(y\). For example:

\[
\text{>> myprog([1 3 0 -4 2 -1], 2)}
\]

\[
\text{ans =}
\]

\[
1 2 0 -2 2 -1
\]

Your program should not use any `for` or `while` loops and it should not use any `if` statements. Your program need not do any error checking. For full credit, write the correct syntax for a MATLAB function (the full contents of the .m file).

5. Write MATLAB code to generate a figure like the one below of the discrete-time signal

\[x(n) = 0.7 (0.95)^n \sin(0.12\pi n) u(n)\]

including axis labels, and title. Also, include the envelope of the signal as a dashed line as in the figure.