

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**,

```
a =  
    5     7     0     3  
    3     2     4     4  
    1     6     2     7
```

determine the result of each of the following commands.

```
>> a(0, 3)  
>> a(2, 1)  
>> a(:, 2)  
>> a(5)  
>> a(end)  
>> a([1 3], 1:3)  
>> a([2 1], 1:3)  
>> a(end, [2 4])  
>> a(3:-1:1, 1:2:4)  
>> a(1:2:end, 1:2:end)  
>> a(end, :)  
>> max(a)  
>> max(a(:))  
>> b = a; b(2,:) = []; b
```

2. Given the following vector **a**,

```
a =  
    8     6     7     3     5
```

determine the result of each of the following commands.

```
>> a(1,3)  
>> a(3,1)  
>> a'  
>> a * a  
>> a .* a  
>> a.^2  
>> [a; a]  
>> [M, k] = min(a)  
>> a > 5  
>> find(a > 5)  
>> a(find(a > 5))
```

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

```
>> n = [-4 -2 0 2 4 6];  
>> x = [3 4 5 2 1 3];  
>> plot(x, 'o')  
>> plot(x)  
>> plot(n,x, 'o')  
>> plot(n,x)  
>> plot(n,x,n,x, 'o')
```

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:

```
>> myprog([1 3 0 -4 2 -1], 2)
```

`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.

