

EE 3054: Signals, Systems, and Transforms

MATLAB Quiz — Fall 2006

No laptop, no notes, no documentation.

1. Given the following array **a**,

a =

```
3     7     6
9     4    10
1     8     3
2     5    11
```

determine the result of each of the following commands.

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

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

```
a =  
    4  
    2  
    3  
    7  
    6
```

determine the result of each of the following commands.

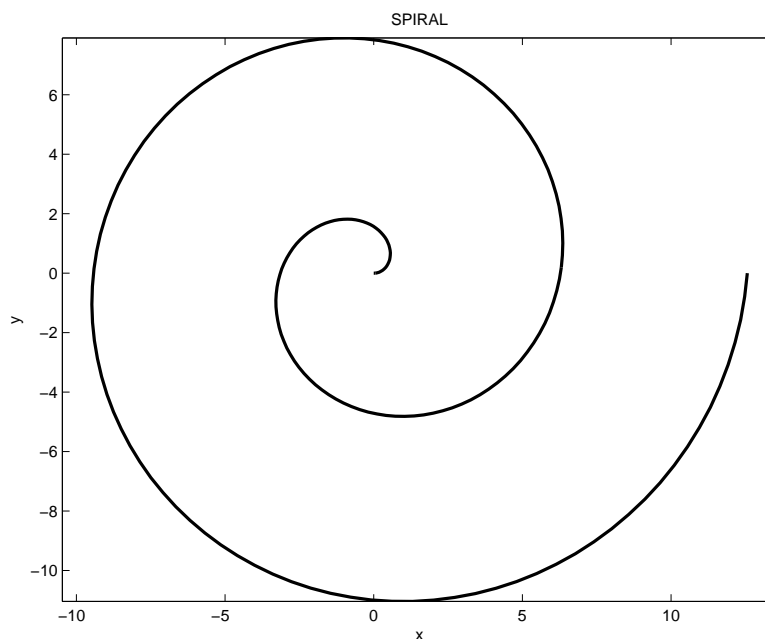
```
>> a(1,3)  
>> a(3,1)  
>> find(a > 5)  
>> a * a  
>> a .* a  
>> [a, a]  
>> [a; a]  
>> [M, k] = min(a); M, k
```

3. Write a MATLAB code fragment to generate the spiral figure illustrated below, including axis labels, and title. The formula for the spiral using polar coordinates is

$$x = \theta \cos(\theta)$$

$$y = \theta \sin(\theta)$$

The figure illustrates the spiral for $0 \leq \theta \leq 4\pi$.



4. The following code fragment produces 3 graphs. Sketch each of the three graphs.

```
>> n = 0:2:8;
>> x = [2 3 1 0 1];
>> plot(n,x)
>> plot(x)
>> stem(n,x)
>> stem(x)
```

5. What is the result of the following commands?

```
>> a = [0 1 0];
>> b = [1 2 3];
>> conv(a,b)
```

6. Write a MATLAB function called `runave` that has one output and one input. (That means, write the contents of the file `runave.m`.) The input is a vector; the output is also a vector. You can assume the input vector is of even length. The output vector should be the average of each pair of input vector values. The length of the output vector should half the length of the input vector.

```
>> runave([5 1 3 6 9 10 1 3])
```

```
ans =
```

```
3.0000    4.5000    9.5000    2.0000
```

because the average of 5 and 1 is 3, the average of 3 and 6 is 4.5, the average of 9 and 10 is 9.5, the average of 1 and 3 is 2.

Your program should not use a `for` or `while` loop and it should not use an `if` statement.