

# EECS 360 Signal and System Analysis

## Lab 3. Loops in Matlab

### Objectives:

The main task of this lab is to get familiar with loops in Matlab including commonly used *for loop*, *while*, and etc.

### Introduction to loops:

Loops are used to repeat statements for a specific number of times. The general format is:

```
for variable = initval : endval
    statement
    ...
    statement
end
```

The scope of the for statement is always terminated with a matching end.

### Examples:

Assume k has already been assigned a value. Create the Hilbert matrix, using zeros to preallocate the matrix to conserve memory:

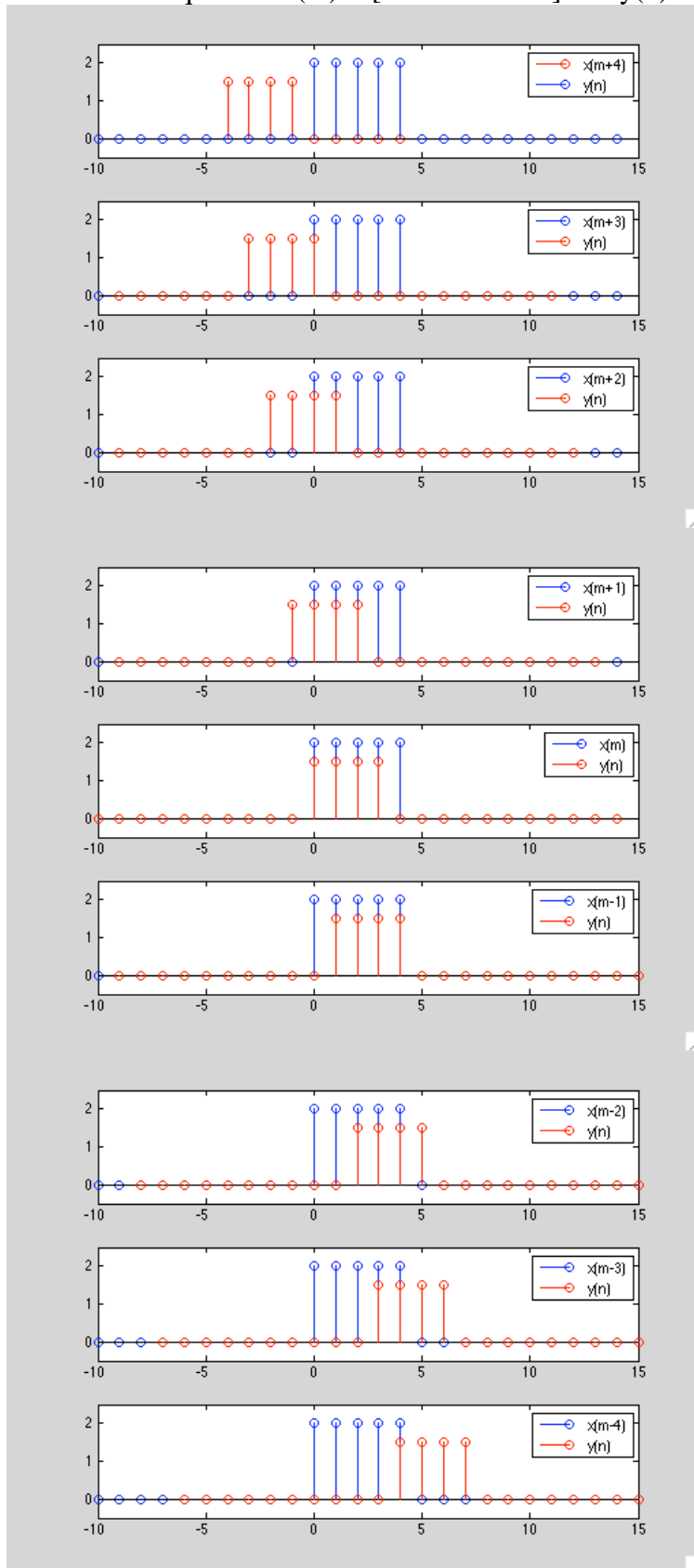
```
clear,clc;
k = 20;
a = zeros(k,k); % Preallocate matrix

for m = 1:k % Outer loop
    for n = 1:k % Inner loop
        a(m,n) = 1/(m+n -1); % Statement
    end % End inner loop
end % End outer loop
```

### Practice:

1. Calculate sequence sum:  $x(n) = 1+2+3+ \dots + 100$  by using a for loop (Hint: define a variable with initial value of 0, and the total number of values is 20 in this sequence.)

Consider two discrete sequences  $x(m) = [1.5 \ 1.5 \ 1.5 \ 1.5]$  and  $y(n) = [2 \ 2 \ 2 \ 2 \ 2]$



Calculate  $x(m)*y(n)$  ranging from -10 to 15, and plot the product by using *stem()* function.

Useful Matlab functions and tricks:

- *ones(m,n)*: creates an m-by-n matrix with all ones
- *zeros(m,n)*: creates an m-by-n matrix with all zeros
- *end*: end can be used to terminate a loop, it is more often used as indexing keywords:

i.e

```
>> x = [1:10]
```

```
x =
```

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

```
>> x(end)
```

```
ans =
```

```
10
```

```
>> x(10)
```

```
ans =
```

```
10
```

- **Shifting a sequence:**

```
>> x = [1:10];
```

```
>> y = [x(end), x(1:9)]
```

```
y =
```

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