

CENG331 Data Communications Fall 2013 – Laboratory Manual II

Special Matrix Functions

eye: returns an identity matrix.

ones: returns a matrix whose elements are all 1.

zeros: returns a matrix whose elements are all 0.

For Loops

```
Syntax:  
  for index = values  
    statements  
  end
```

Example:

```
a = 1;  
for i = 2:6  
  a = a * i - 1;  
end
```

While Loops

```
Syntax:  
  while expression  
    statements  
  end
```

Example:

```
a = 1;  
i = 1;  
while i < 6  
  a = a * i - 1;  
  i = i+1;  
end
```

If Statement

```
Syntax:  
if expression  
    statements  
elseif expression  
    statements  
else  
    statements  
end
```

Example:

```
m = eye (3)  
t = ones(3)  
for i = 1:3  
    for j = 1:3  
        if t(i,j) == m(i,j)  
            t(i,j) = 0;  
        end  
    end  
end  
end
```

Declaring Functions

In MATLAB you can declare your own functions, save them to their own function files and can call them later at any time. Given below is a simple MATLAB function.

```
function ret = myFactorial(n)  
% myFactorial  Calculates the factorial of a given number  
%  
% Input :    n = number of which the factorial will be calculated  
% Output: ret = calculated factorial  
  
i=1;  
ret=1;  
for i=2:n;  
    ret = ret*i;  
end
```

Write these lines into a new MATLAB function and save the file as "myFactorial.m". The comment lines in the beginning are shown when the function is called with help command (e.g. "help myFactorial"). A sample usage of this function is shown below:

```
> a = myFactorial(5)  
a = 120
```

Input and Output

Getting keyboard inputs from users is achieved with “input” function in MATLAB:

```
> res = input('Type a number: ')
Type a number: 7
res = 7
```

Displaying outputs is achieved with “disp” function:

```
> disp('Your input is: '), disp(res)
```

Input and Output

Writing to files:

```
x = 1:10;
y = [x; power(x,2)];

fp = fopen('power.txt', 'w');
fprintf(fp, 'Number Number^2\n');
fprintf(fp, '%-7d %d\n', y);
fclose(fp);
```

Reading from files (assuming you have a file containing 5 numbers):

```
fp = fopen('myfile.txt', 'r');
a = fscanf(fp, '%d', 5);
fclose(fp);
disp(power(a,2))
```