For Loops 1
ENGR 1181
MATLAB 8
For Loops and Looped Programming in Real Life

Looping within programs has long been a useful tool for completing mundane tasks over and over again. The focus of today’s lesson is fixed number looping although later you will learn about indefinite looping (while looping). Internal combustion engines use a combination of these loops for controlling the spark plugs and valves during a four stage cycle. The engine completes these four stages (for loop) while the car is engine is running indefinitely (while loop, to be learned later).
Today's Learning Objectives

- After today’s class, students will be able to:
  - Explain the iterative nature of loops.
  - Use loops properly for repetitive processes, including the utilization of loop indices as counters and variables.
What is a Loop?

- A loop allows a group of commands in a program to be repeated.

- Each repetition of the loop is called a pass.

- Either the number of passes can be fixed.

- Or the loop can be terminated after some condition is satisfied.
Examples of basic for–end Loops

```
for k = 1:3
    disp(k)
end
```

Output:

```
1
2
3
```
Examples of basic for–end Loops

```matlab
X=[5, 10, 15, 20];
for i = 1: length(X)
    disp(X(i))
end
```

Output:

```
5
10
15
20
```
Create the vector \( v = [2 \ 4 \ 6 \ 8] \). Calculate and print the square of each element.

\[
v = [2 \ 4 \ 6 \ 8] ; \\
for \ k = 1 : 4 \\
\quad vs(k) = v(k)^2 \\
end
\]

Output:

\[
vs = \\
\quad 4 \\
vs = \\
\quad 4 \ 16 \\
vs = \\
\quad 4 \ 16 \ 36 \\
vs = \\
\quad 4 \ 16 \ 36 \ 64
\]
Additional Example

- Calculate the factorial of integers 1 through 5 inclusive.

```matlab
clc
clear

% This script file calculates the factorial of a number
% Declare the number you wish to calculate the factorial for
n = 5;
% Calculate factorial using a for loop
x = 1;
for i = 1:n
    x = x*i;
end
fprintf('The factorial of %i is %i\n',n,x)
```
Important Takeaways

- A loop allows a group of commands to be repeated.
- A for loop repeats a specified number of times and the loop index variable determines when the for loop ends.
- The for loop index variable can also be used to index values from arrays.
Preview of Next Class

- For Loops 2
  - Review of basic for loops
  - Nesting conditional statements in for loops
  - ‘Break’ and ‘Continue’ Loops
What’s Next?

- Review today’s Quiz #08
- Open the in-class activity from the EEIC website and we will go through it together.
- Then, start working on MAT-08 homework.
- Prepare for next class by reading about computer problem solving in MATLAB.