

Day 4

- Quiz
- “For” loops
- Tables with “For” loops
- (Exercises)

ME123 Computer Programming

“For” loops

“For” loops are used to do repetitive tasks

```
loop.m x
1 -   clc
2 -   for m=1:4
3 -       fprintf('Hello World.\n');
4 -   end
```

Start at m=1

End when m=4

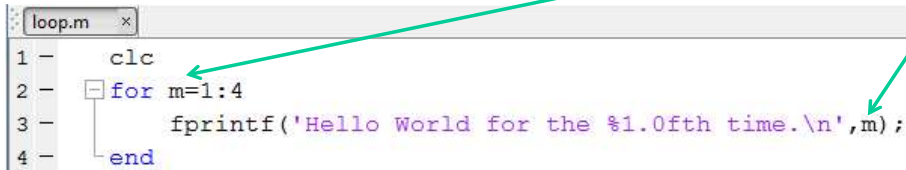
```
Command Window
Hello World.
Hello World.
Hello World.
Hello World.
fx >>
```

So it prints 4 times

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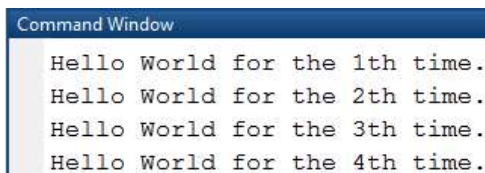
“For” loops

You can do things with the “loop variable” *m* inside the loop



```
loop.m x
1 -   clc
2 -   for m=1:4
3 -       fprintf('Hello World for the %1.0fth time.\n',m);
4 -   end
```

A screenshot of a MATLAB code editor window titled 'loop.m'. The code consists of four lines: line 1 is 'clc', line 2 is 'for m=1:4', line 3 is 'fprintf('Hello World for the %1.0fth time.\n',m);', and line 4 is 'end'. A green arrow points from the text above to the variable 'm' in the for loop header, and another green arrow points from the same text to the variable 'm' in the fprintf function call.



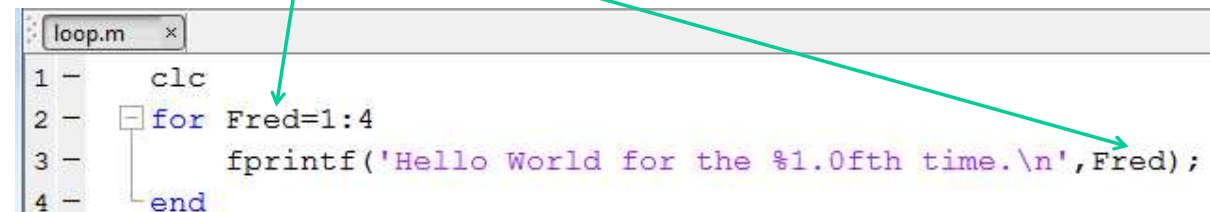
```
Command Window
Hello World for the 1th time.
Hello World for the 2th time.
Hello World for the 3th time.
Hello World for the 4th time.
```

A screenshot of the MATLAB Command Window showing the output of the script. It displays four lines of text: 'Hello World for the 1th time.', 'Hello World for the 2th time.', 'Hello World for the 3th time.', and 'Hello World for the 4th time.'.

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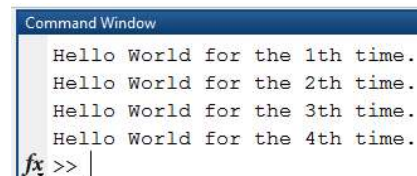
“For” loops

The loop variable can have any valid variable name



```
loop.m x
1 -   clc
2 -   for Fred=1:4
3 -       fprintf('Hello World for the %1.0fth time.\n',Fred);
4 -   end
```

A screenshot of a MATLAB code editor window titled 'loop.m'. The code consists of four lines: line 1 is 'clc', line 2 is 'for Fred=1:4', line 3 is 'fprintf('Hello World for the %1.0fth time.\n',Fred);', and line 4 is 'end'. A green arrow points from the text above to the variable 'Fred' in the for loop header, and another green arrow points from the same text to the variable 'Fred' in the fprintf function call.



```
Command Window
Hello World for the 1th time.
Hello World for the 2th time.
Hello World for the 3th time.
Hello World for the 4th time.
fx >> |
```

A screenshot of the MATLAB Command Window showing the output of the script. It displays four lines of text: 'Hello World for the 1th time.', 'Hello World for the 2th time.', 'Hello World for the 3th time.', and 'Hello World for the 4th time.'.

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“For” loops

For loops increment by 1 each time unless you give a different increment value

```
loop.m x
1 -   clc
2 -   for m=1:2:8
3 -       fprintf('Hello World for the %1.0fth time.\n',m);
4 -   end
```

Start at 1, increment by 2, end at (or before) 8

```
Command Window
Hello World for the 1th time.
Hello World for the 3th time.
Hello World for the 5th time.
Hello World for the 7th time.
fx >> |
```

1, 3, 5, 7, then done

“For” loops

For loops can go from high to low with a negative increment

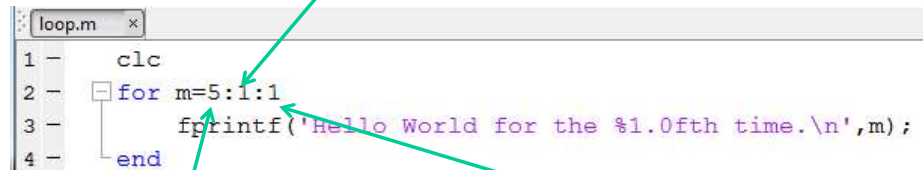
```
loop.m x
1 -   clc
2 -   for m=5:-1:1
3 -       fprintf('Hello World for the %1.0fth time.\n',m);
4 -   end
```

```
Command Window
Hello World for the 5th time.
Hello World for the 4th time.
Hello World for the 3th time.
Hello World for the 2th time.
Hello World for the 1th time.
fx >>
```

“For” loops

Some loops don't execute at all

increment (1) is positive



```
loop.m x
1 -   clc
2 -   for m=5:1:1
3 -       fprintf('Hello World for the %1.0fth time.\n',m);
4 -   end
```

The screenshot shows a MATLAB script named 'loop.m' with four lines of code. Line 2 contains a for loop: 'for m=5:1:1'. A green arrow points from the text 'increment (1) is positive' to the '1' in the loop definition. Another green arrow points from the text 'Start value (5) is already bigger than end value (1)' to the '5' in the loop definition.

Start value (5) is already bigger than end value (1)

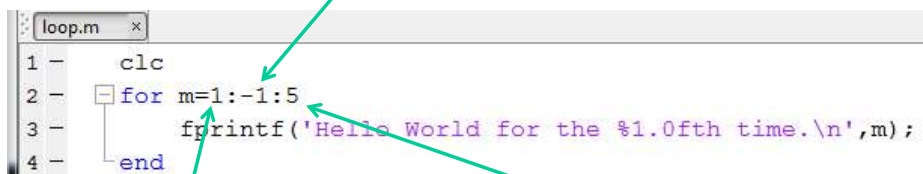
(Nothing prints.)

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“For” loops

Some loops don't execute at all

increment (-1) is negative



```
loop.m x
1 -   clc
2 -   for m=1:-1:5
3 -       fprintf('Hello World for the %1.0fth time.\n',m);
4 -   end
```

The screenshot shows a MATLAB script named 'loop.m' with four lines of code. Line 2 contains a for loop: 'for m=1:-1:5'. A green arrow points from the text 'increment (-1) is negative' to the '-1' in the loop definition. Another green arrow points from the text 'Start value (1) is already smaller than end value (5)' to the '1' in the loop definition.

Start value (1) is already smaller than end value (5)

(Nothing prints.)

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“For” loops

Loop variables can be floating point numbers

```
loop.m x
1 -   clc
2 -   for time=0:0.1:0.5
3 -       fprintf('The time is now %4.2f seconds \n',time);
4 -   end
```

```
Command Window
The time is now  0.00 seconds
The time is now  0.10 seconds
The time is now  0.20 seconds
The time is now  0.30 seconds
The time is now  0.40 seconds
The time is now  0.50 seconds
fx >> |
```

“For” loops

Stop a loop with “control-c” if you get too much output.

```
loop.m x
1 -   clc
2 -   for time=0:0.00001:5.0
3 -       fprintf('The time is now %8.5f seconds \n',time);
4 -   end
```

will print
50000
lines!

Click in the command window, hold down Ctrl and c at the same time.

```
The time is now  1.86478 seconds
The time is now  1.86479 seconds
The time is now  1.86480 seconds
Operation terminated by user during loop (line
3)
fx >> |
```

You may need to
keep hitting
control-c until
Matlab pays
attention to you

Tables with “For” loops

For loops are good for making tables

```
loop.m x
1 -   clc
2 -   fprintf('Squares of Integers\n');
3 -   fprintf('Integer    Square \n');
4 -   for m=1:5
5 -       m_squared=m*m;
6 -       fprintf(' %1.0f    %2.0f \n',m,m_squared);
7 -   end
```

Title and row headings print once— outside and before the loop

```
Command Window
Squares of Integers
Integer    Square
1          1
2          4
3          9
4         16
5         25
fx >>
```

Inside the loop we just print the numbers— no words

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Tables with “For” loops

Be careful when printing to a file in a For loop

```
loop.m x
1 -   clc
2 -   file_number=fopen('Day4_Ex1.txt','w');
3 -   fprintf(file_number,'Squares of Integers\n');
4 -   fprintf(file_number,'Integer    Square \n');
5 -   for m=1:5
6 -       m_squared=m*m;
7 -       fprintf(file_number,' %1.0f    %2.0f \n',m,m_squared);
8 -   end
9 -   fclose(file_number);
```

Open file before you start any printing

Close file after you finish the entire loop

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