

CS005 Introduction to Programming: Matlab

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EDU>> kilo2miles

I will convert kilometers to miles for you.

Enter number to convert or negative number to quit : 3

3

Lets fix this



kilometers is

1.864

miles

Enter number to convert or negative number to quit : -1

Thank you for using my program

EDU>> kilo2miles

I will convert kilometers to miles for you.

Enter number to convert or negative number to quit : 3

3 kilometers is 1.864 miles

So we can



have this

Enter number to convert or negative number to quit : -1

Thank you for using my program

String Review

```
EDU>> FirstName = 'eamonn' ;
```

```
EDU>> LastName = 'keogh' ;
```

```
NewString = [ 'Dr. ' , FirstName, ' ' , LastName ];
```

```
NewString =
```

```
Dr. eamonn keogh
```

We can make new strings, by combining literal strings and variables

String Review

```
EDU>> FirstName = 'eamonn' ;
```

```
EDU>> LastName = 'keogh' ;
```

```
EDU>> NewString = [ 'Dr. ' , FirstName, ' ', upper(LastName) ]
```

```
NewString =
```

```
Dr. eamonn  KEOGH
```

It is possible that some of the strings used to make a longer string, are the return values from a function call. In this case, the string returned by a call to `upper`

String Conversion

```
EDU>> HisAge = 24;
```

% assigning a number

```
EDU>> KidsAges = [ 3, 4,2 ];
```

% assigning an array

```
EDU>> FirstName = 'eamonn' ;
```

% assigning a string

```
EDU>> X = 'five' ;
```

% assigning a string

HisAge is a mathematical object. We can add it, divide it, multiply it etc.

It should be obvious that X is not a mathematical object. That is to say 'five' is not a mathematical object, we cannot add, divide or multiply X, anymore than we could divide 'eamonn' by 'fink-nottle' by

```
EDU>> HisAge = 24;
```

% assigning a number

What can we do with HisAge?

We can add, divide, subtract, multiply, raise a number to its power, pass it into a function that expects a number such as log, sin, cosine, max, min etc

```
EDU>> FirstName = 'eamonn' ;
```

% assigning a string

What can we do with FirstName?

We can pass it into a function that expects a string, such as upper, lower etc. We can change/delete individual characters etc

```
EDU>> X = 'five' ;
```

% assigning a string

So upper(X) is legal, and returns 'FIVE'

However X + 4 is not legal, any more than FirstName + 4 is legal

or 'eamonn' + 7 is legal

```
EDU>> X = 'five' ;
```

% assigning a string

So upper(X) is legal, and returns 'FIVE'

However X + 4 is not legal, any more than FirstName + 4 is legal

```
EDU>> X = '5' ;
```

% assigning a string

upper(X) is legal, and returns '5'

However X + 4 is not legal, any more than FirstName + 4 is legal

It is critical to recognize that X does not contain a *number*, it contains a *string*, that *happens* to be the character that we use for a number.

It might be helpful to consider..

```
EDU>> X = '5' ;
```

% assigning a string

```
EDU>> X = '5%' ;
```

% assigning a string

```
EDU>> X = '5ive' ;
```

% assigning a string

```
EDU>> X = 'this5way' ;
```

% assigning a string

```
EDU>> X = 5.1
```

% assigning a number

```
X =
```

```
5.1000
```

```
EDU>> Y = '5.1'
```

% assigning a literal string

```
Y =
```

```
5.1
```


String to Number Conversion

```
DU>> TestString = '5'
```

```
TestString =
```

```
5
```

```
EDU>> X = str2num(TestString)
```

```
X =
```

```
5
```

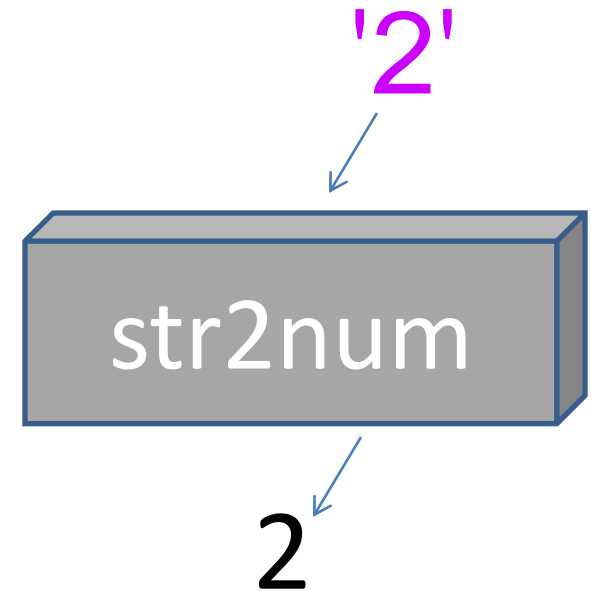
```
EDU>> str2num(TestString) + 7
```

```
ans =
```

```
12
```

```
EDU>>
```

The built-in function
`str2num` attempts to convert
a string to a number



```
EDU>> str2num('5')
```

```
ans =
```

```
5
```

```
EDU>> str2num('5.34')
```

```
ans =
```

```
5.3400
```

```
EDU>> str2num('5.34%')
```

```
ans =
```

```
[]
```

```
EDU>> str2num('seven')
```

```
ans =
```

```
[]
```

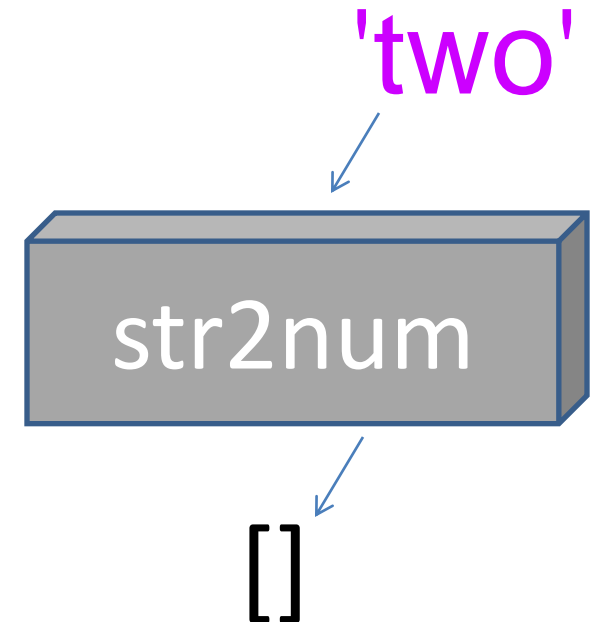
```
EDU>> str2num('eamonn')
```

```
ans =
```

```
[]
```

The built-in function `str2num` attempts to convert a string to a number.

If matlab cannot convert the string to a number, it returns the empty set `[]`



Number to String Conversion

```
EDU>> num2str(5)
```

```
ans =
```

```
5
```

← This is a string!

```
EDU>> num2str(5 + 2)
```

```
ans =
```

```
7
```

← This is a string!

```
EDU>> num2str(5.12)
```

```
ans =
```

```
5.12
```

← This is a string!

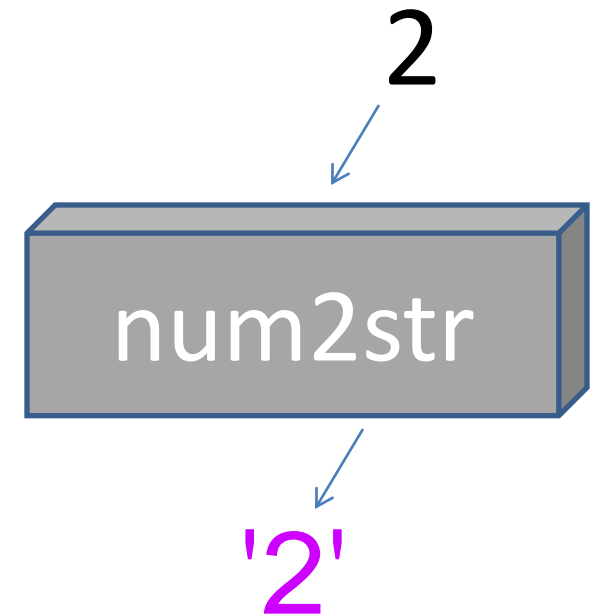
```
EDU>> num2str( sqrt(24))
```

```
ans =
```

```
4.899
```

← This is a string!

The built-in function
`num2str` converts a number
to string



```
EDU>> ['I have ', '5', ' cats']
```

```
ans =
```

```
I have 5 cats
```

```
EDU>> ['I have ', 5, ' cats'] % NO! the 5 is not a string
```

```
ans =
```

```
I have cats
```

% What happened here?

% This is correct, this IS a string

```
EDU>> ['I have ', num2str(5), ' cats']
```

% This is correct, this IS a string

```
EDU>> ['I have ', num2str(5) , ' cats']
```

```
EDU>> CatCount = 17;
```

```
EDU>> ['I have ', num2str(CatCount) , ' cats']
```

```
ans =
```

```
I have 17 cats
```

```
for i = 1 : 5  
    disp(['I have ', num2str(i) , ' cats'])  
end
```

I have 1 cats
I have 2 cats
I have 3 cats
I have 4 cats
I have 5 cats



```
for i = 1 : 10
    disp([num2str(i), ' US dollar = ', num2str(i*0.7499) , ' euros'])
end
```

We can now fix this!

```
EDU>> kilo2miles
I will convert kilometers to miles for you.
Enter number to convert or negative number to quit : 3
3
kilometers is
1.864
miles
Enter number to convert or negative number to quit : -1
Thank you for using my program
```

```
1 US dollar = 0.7499 euros
2 US dollar = 1.4998 euros
3 US dollar = 2.2497 euros
4 US dollar = 2.9996 euros
5 US dollar = 3.7495 euros
6 US dollar = 4.4994 euros
7 US dollar = 5.2493 euros
8 US dollar = 5.9992 euros
9 US dollar = 6.7491 euros
10 US dollar = 7.499 euros
```

Lab 7: Part 1

- Write a function called `EightTimesTable()`. This function is nearly identical to `SevenTimesTable()` in the lecture notes and to `FiveTimesTable()` from a previous homework.
- It will display the eight times table for numbers from zero to ten (not 1 to ten).
- The function will print each multiplication in a single line, like this....
 - `0 times 8 is 0`
 - `1 times 8 is 8`
 - `2 times 8 is 16`

Lab 7: Part 2

Write a function that asks a user their name, then prints out a letter by letter summary of the name (see below) then returns the number of letters in the name

```
EDU>> CountLettersInName
Enter your name : eamonn
The 1 letter in your name is e
The 2 letter in your name is a
The 3 letter in your name is m
The 4 letter in your name is o
The 5 letter in your name is n
The 6 letter in your name is n
ans =
     6
EDU>>
```

```
function LetterCount = CountLettersInName()

UsersName = input('Enter your name : ','s');

for i = 1 : length(UsersName)

    disp(['The ', num2str(i), ' letter in your name is ',UsersName(i)])
end

LetterCount = length(UsersName);

end
```

```
EDU>> input('Enter your age : ')
Enter your age : 17
ans =
    17
EDU>> input('Enter your name : ','s')
Enter your name : Joe
ans =
Joe
```

When we are getting
a string, we need
the string flag 's'



Lab 7: Part 3

Write a function that asks a user their name, then prints out...

Three times the first letter, in lower case

Three times the second letter, in upper case

Three times the third letter, in lower case

Etc

And returns the names length

Hint: first test and then use your IsOdd function

EDU>> CountLettersInName2();

Enter your name : **eamonn**

eee

AAA

mmm

ooo

nnn

NNN

```
function LetterCount = CountLettersInName2()
    UsersName = input('Enter your name : ','s');

    for i = 1 : length(UsersName)
        if IsOdd(i)
            disp([lower(UsersName(i)), lower(UsersName(i)), lower(UsersName(i))]);
        else
            disp([upper(UsersName(i)), upper(UsersName(i)), upper(UsersName(i))]);
        end
    end

    LetterCount = length(UsersName);
end
```

Lab 7: Part 4

Write a function that asks a user their name, then
prints out every truncation of the name (see sample)
And returns the names length

```
EDU>> CountLettersInName3();  
Enter your name : eamonn  
eamonn  
amonn  
monn  
onn  
nn  
n
```

```
function LetterCount = CountLettersInName3()  
  
    UserName = input('Enter your name : ');  
  
    for i = 1 : length(UserName)  
        LetterCount = length(UserName(i:length(UserName)));  
    end  
  
    LetterCount = length(UserName);  
end
```

Lab 7: Part 5

Redo CS005 lab 4, part 4.

However this time print each multiplication on a single line.

CS005 lab 4, part 4.

Part 4:

Write a function called `FiveTimesTable_KtoL()` (Before you begin, read the `CountFromKuptoL(K, L)` example in the slides again). This function prints a subset of the five times table.

```
EDU>> FiveTimesTable_KtoL(3,6)
Five times
  3
is
 15
Five times
  4
is
 20
Five times
  5
is
 25
Five times
  6
is
 30
```

```
EDU>> FiveTimesTable_KtoL(0,2)
Five times
  0
is
  0
Five times
  1
is
  5
Five times
  2
is
 10
```

Lab 7: Part 6

Redo CS005 lab 6, part 3

However this time print each conversion on a single line.

Lab 6: Part 3, Write a Conversion Script

Let us write a script that converts numbers from kilometers to miles, **while** the user wants to continue..

We need a way for the user to signal that he/she is finished, let us use a negative number to signal this...

(for now, it will have to be written with 4 disp function calls)

```
EDU>> kilo2miles
I will convert kilometers to miles for you.
Enter number to convert or negative number to quit : 3
3
kilometers is
1.864
miles
Enter number to convert or negative number to quit : -1
Thank you for using my program
```

Lab 7: Part 7

Let us write a script that takes in the current dollar to yen conversion rate (Google it), and converts dollars to yen, **while** the user wants to continue..

We need a way for the user to signal that he/she is finished, let us use the word **FINISHED**

Hint: Read in the screen input as a string, not as a number.

Convert it to a number, only if we are not quitting this time.

To know if we are to exit the loop, we only need to test the first letter/character of the string.

Read the code on the next page very carefully

```
EDU>> USD2Yen(80.0700)
```

```
I will convert dollars to yen for you.
```

```
Enter number to convert or FINISHED to quit : 3
```

```
3 USD is 240.2100 Yen.
```

```
Enter number to convert or FINISHED to quit : FINISHED
```

```
Thank you for using my program
```

```
EDU>> XXX = input('Enter your age or STOP to quit ','s')
```

```
Enter your age or STOP to quit STOP
```

```
XXX =
```

```
STOP
```

```
EDU>> if XXX(1) == 'S', disp(['you entered STOP']), end
```

```
you entered STOP
```

```
EDU>> XXX = input('Enter your age or STOP to quit ','s')
```

```
Enter your age or STOP to quit 23
```

```
XXX =
```

```
23
```

```
EDU>> if XXX(1) == 'S', disp(['you entered STOP']), end
```

```
EDU>>
```