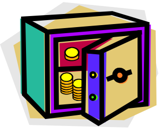
Storing Values for Safe Keeping

Variables and their Values

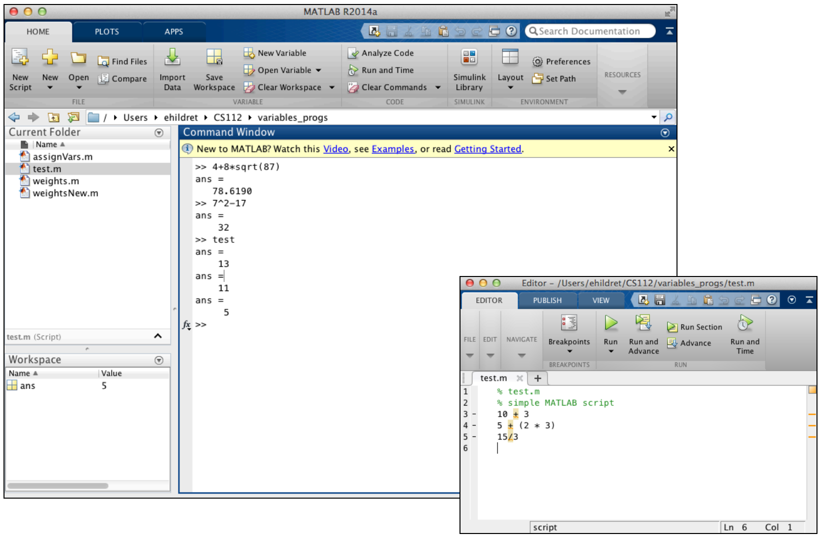


CS112 Scientific Computation

Department of Computer Science

Wellesley College

MATLAB programming environment



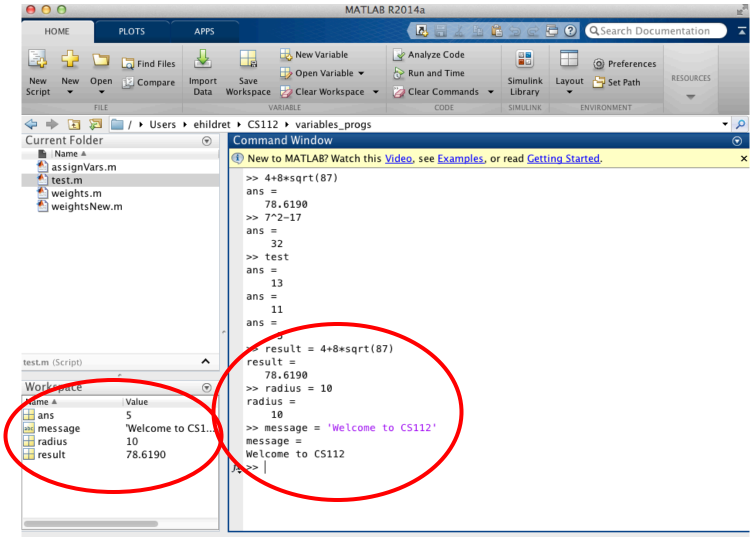
Name	Value
ans	5

New to MATLAB? Watch this Video, see Examples, or read Getting Started.

```
>> 4+8*sqrt(87)
ans =
   78.6190
>> 7^2-17
ans =
    32
>> test
ans =
    13
ans =
    11
ans =
     5
>>
```

```
% test.m
% simple MATLAB script
10 + 3
5 + (2 * 3)
15/3
```

Storing values in variables



Name	Value
ans	5
message	'Welcome to CS1...
radius	10
result	78.6190

```
>> 4+8*sqrt(87)
ans =
   78.6190
>> 7^2-17
ans =
    32
>> test
ans =
    13
ans =
    11
ans =
     5
>> result = 4+8*sqrt(87)
result =
   78.6190
>> radius = 10
radius =
    10
>> message = 'Welcome to CS112'
message =
Welcome to CS112
>> 
```

Assignment statements

- General format of an assignment statement:

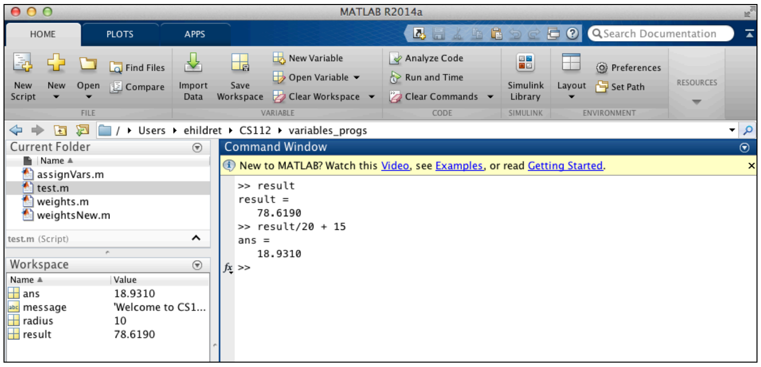
  variable-name = expression

- Right hand side can be any expression that evaluates to a value:

  >> hypotenuse = sqrt(3^2 + 4^2)

- Executing an assignment statement:
  1) **evaluate the expression** on the right side
  2) **assign value** of expression to variable named on the left side

Using variables in expressions



```
>> result
result =
   78.6190
>> result/20 + 15
ans =
   18.9310
>> 
```

Name	Value
ans	18.9310
message	'Welcome to CS1...
radius	10
result	78.6190

Create a variable to store the circumference of a circle with the stored value of radius

Hunting for 's

```
>> x = 17

>> x + 1 = 10

>> x = x / x + x

>> diff = (x - y) / 2

>> end = x - 18

>> y = x = 2
```

Assigning variables in a script

- Statements in script are executed as if they were typed directly into the Command Window
- Variables created in CW can be changed by assignments in scripts and vice versa!

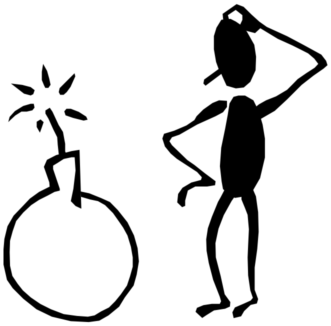
```
% assignVars.m
% assigns variables
% to values

a = 1
b = 2
c = 3
```

Speaking of 's

- What would happen if the script contained a syntax error? For example:

```
% buggyScript.m
a = 10
b = 20 +
c = 30
```



What's in a name?

- **Variable names** must start with a letter and may contain any number of letters, digits and underscore characters ('_')

  C3PO **my_monthly_pay** **yourTurn**

- Case matters!

  sohie ≠ Sohie

- MATLAB reserves some words for special purposes:

  break case catch continue else elseif end
  for function global if otherwise persistent
  return switch try while

Choose concise, meaningful names

- The good, the bad, & the ugly

  maxArea
  xxyyzz_3b
  totalMonthlyHedgeFunds
  2pi
  tf
  result

- Case matters!

  sohie ≠ Sohie

THE OCEAN IS SO...
BIG!
YES! AND IT'S SO... SO...
BLUE!
YOU BEGIN TO APPRECIATE WHAT HERMAN MELVILLE WAS UP AGAINST!
Johnson 8/15 ©2006 by NEA, Inc.

Time-out exercise

- Write a sequence of assignment statements that exchange the values of **thing1** & **thing2**

- **Before**

thing1	2
thing2	5

- **After**

thing1	5
thing2	2

Floating point numbers

- Decimal numbers are represented as a type called **double**

```
>> number = 8.43
number =
      8.4300
```

- MATLAB normally prints 4 digits after the decimal point and rounds numbers up or down to fit*

* Compact notation is used only for printing - try typing **format long**

Really big & really little numbers

- MATLAB uses scientific notation to print very large or very small numbers

```
>> number = 1230000000
number =
    1.2300e+09
>> number = 0.000789
number =
    7.8900e-04
```

- MATLAB has a special representation for really big numbers

```
>> number = 1.2e+9999
number =
       Inf
```

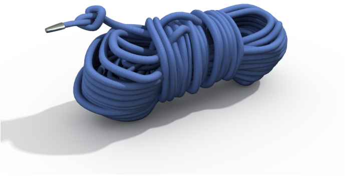
* What do get when you type: **1/0** or **1/inf** or **0*inf**?

Strings

- **Strings** consist of letters, digits, symbols, and white space, surrounded by single quotes:

```
myName = ‘Sam I am’
eec = ‘ )&it:s;elf,’
thirteen = ‘6 + 7’
```

- Common 🐞 ‘s



```
callMe = Ishmael
reply = ‘Madam, I’m Adam’
```

Unfriendly programs

- The following program converts pounds to stones:

```
% weights.m
pounds = input(' ');
stones = 0.0714 * pounds
```

- If we run it by typing

```
>> weights
```

it would just sit there and look at us

Friendly programs

- Tell the user what's needed and what's printed:

```
% weights.m
pounds = input('Enter your weight in pounds: ');
disp('Your weight in stones is: ');
stones = 0.0714 * pounds
```

- When run…

```
>> weights
Enter your weight in pounds: 120
Your weight in stones is:
stones =
     8.5680
```