Storing Values for Safe Keeping

Variables and their Values

CS112 Scientific Computation
Department of Computer Science
Wellesley College

MATLAB programming environment
Storing values in variables

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

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

Hunting for ‘s

```matlab
>> 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!

```matlab
% 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:

```matlab
% 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
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`

  ```matlab
  >> 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

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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
  ```