

CS100M/CIS121/EAS121

Introduction to Computer Programming

Spring 2004

Lecture 13

More MATLAB

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Announcements

- Prelim 2 on Thurs March 18
 - Approved conflict? e-mail Kelly with the **subject: 100M (or 121), Prelim 2, conflict**
 - deadline: Friday, 3/12, 9am
- Java coming up! see lecture schedule on-line
- CIS/EAS:
 - Prelim 2 is your final exam
 - Exam, Course grades: CMS
 - Courses evals: likely on CMS (stay tuned)

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Summary

- Problem Solving
- Programming Language: chars, tokens, statements
- Statements: I/O, assign, expression, control, func.
- Expr: arrays, quantity, boolean, character
- Control: select, repeat
- Function: create your own little subprograms!
- What else is there?

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Other MATLAB Thingies

- More function syntax
- More data types: Structures and Cell Arrays
- Object Oriented Programming
- GUIs
- Other Languages
- Simulink
- much more.... only a few more covered here

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Subfunction

- **Subfunction**: A function written below another function in the same M-File
 - The first function is visible in the command window workspace and can be called by other first functions
 - The subfunctions in the M-File cannot be called from outside the M-Function
- Example

```
function value = theTop(x)
    value = theSub(x,2);
function value = theSub(x,y)
    value = x + y;
```

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Fun Fun

- **function function**
 - function with an input argument of the name(s) of other function(s)
 - usually input names are strings
 - example) **ezplot('cos(x)')** plots **cos(x)** without you supplying other inputs
- See **demofunfun**
- See **help funfun**

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Recursion

- function calls itself
 - break problem into small pieces
 - solve each piece and combine results
 - need to determine what to do for smallest piece and general case
- example)

```
function result = myLength(A)
    if isempty(A)
        result = 0;
    else
        result = 1 + myLength(A(2:end));
    end
```

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Structure

- Form composite data types
- Example:
 - Person has a name, ID, age, ...
 - How to represent info for Dani, 123456, 28, ... ?
- Better solution: use **structure**
 - Noun with parts
 - MATLAB: **struct**

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MATLAB Structure

- Noun has parts
 - Person1 has its own name, ID
 - Person2 has its own name, ID
 - And so on
- Examples

`p1.name`
`p2.id`
- Syntax and More Examples:
 - Use **struct** function:
`struct(label1, values1, label2, values2, ...)`
`p1 = struct('name', 'Dani', 'ID', 65431)`
`p1.ID = 666666`
 - see posted examples for more info

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Cells

- MATLAB is weakly typed
 - Everything is indeed an array, but...
 - Usually bad idea to mix different types
- Cells are most general array
 - Call hold arrays of different types
 - Can include empty arrays as elements (thus making non-rectangular arrays)
- See posted examples for more info

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