Introduction to Computer Programming Using Matlab

Our Goals

- Develop some basic programming concepts
- Learn to use the Matlab programming environment
- Use programming to do both analytical and creative work

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Computer programming is …

- a tool used by computer scientists, engineers, and other professionals
- not computer science

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Computer problem solving

Key: Algorithmic thinking

Algorithm:

A step-by-step procedure that takes you from a prescribed set of inputs to a prescribed set of outputs.

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Etymology of "Algorithm"

Algorithm

← Al-Kwarizmi

← Islamic mathematician/astronomer born in Baghdad in the 8th century.

Developed methods for arithmetic with the "new" Hindu/Arabic place-value system.

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Computer Programming

- Developing instructions for the computer to execute (in order to solve some problem)
- The steps must be logical
- Use a particular language *and follow the rules of the language* (grammar/syntax)

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Example: *Adding songs from the internet to your music library*

- Find a website with MP3 or other audio files
- Register with the music site, if required for music downloading. (Don't steal music.)
- Click on the music file to download it onto your computer
- Drag the file to your library

Reference: iTunes

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Example: *Adding songs from the internet to your music library*

- Drag the file to your library
- Click on a music file to download it onto your computer
- Find a website with MP3 or other audio files
- Register with the music site, if required for music downloading. (Don't steal music.)

These steps are out of order! Illogical!

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Example: *Adding songs from the internet to your music library*

- Find a website with MP3 or other audio files
- Register with the music site, if required for music downloading. (Don't steal music.)
- Click [redacted] file to dowNload [redacted]
- file Drag your librAry to

Bad grammar (syntax)!

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- Let's start Matlab and use it to calculate the area of a trapezoid

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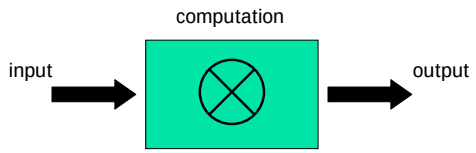
A computer program



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What will be in our program?

- Input
  - Get trapezoid data from the user
  - Need b1, b2, h
- Calculation
  - Just use the formula to calculate (and store) the answer
- Output
  - Show the result on the screen
- Comments
  - "explanations" for humans; computer ignores comments.

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Input & output

- *variable* = **input** ('*prompt* ')
- **fprintf** ('*message to print* ')

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Input & output

- *variable* = **input** ('*prompt* ')

```
h= input('Enter the height: ');
```

- **fprintf** ('*message to print* ')

```
fprintf('Hello!')
fprintf('Area is %f\n', x)
```

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Calling a built-in function

- You only need to know the name of the functions and how to use it
- E.g., to evaluate the sine of 2 radians you type

```
sin(2)
```

i.e., you call the function by its name and give it one single value to work on.

- To use the remainder function, e.g.,

```
rem(315,7)
```

This function needs two values.

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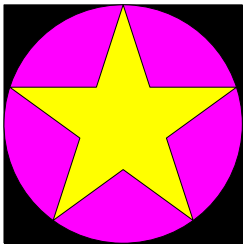
Play with graphics function

```
DrawRect(...)
DrawDisk(...)
DrawStar(...)
```



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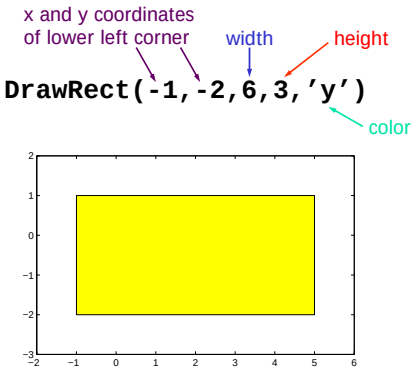

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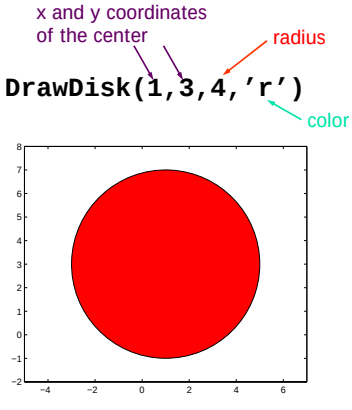

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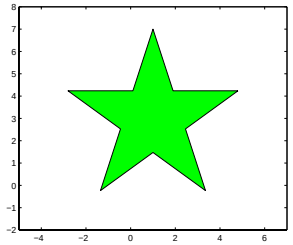
x and y coordinates of the center

"radius"

```
DrawStar(1,3,4,'g')
```

color



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Color Options

White	'w'
Black	'k'
Red	'r'
Blue	'b'
Green	'g'
Yellow	'y'
Magenta	'm'
Cyan	'c'

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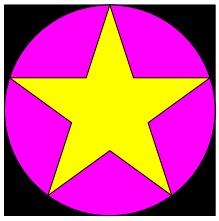
Write a script to draw this diagram

draw a black square;

then draw a magenta disk;

then draw a yellow star.



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A general graphics framework

```
% drawDemo
close all
figure
axis equal off
hold on

  Code fragment to draw the
  objects (rectangle, disk, star)


hold off
```

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```
% drawDemo
close all
figure
axis equal off
hold on

DrawRect(0,0,2,2,'k')
DrawDisk(1,1,1,'m')
DrawStar(1,1,1,'y')

hold off
```

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