What is programming?

- A program is a list of steps required to do something.
- The lists of instructions are the computer programs
- The stuff the instructions manipulate can be numbers, words, graphics, etc...

Programming languages

- There are many different programming languages.
- Here, we will use MATLAB.
- Other languages include python, C, C++, Java, Pearl, Fortran, LISP. These are other languages.

Syntax

- The format of the instructions is called syntax.
- Syntax is very important!
- If commands don't follow the syntax of the language you're using, the computer won't understand what you're asking it to do.

A simple function

- Programming in a high-level language:
  ```matlab
  >> disp(‘Hello world!’)
  ```
- DISP is a function in MATLAB. When it is evaluated (i.e. when MATLAB carries out your instructions), DISP takes whatever is inside the parentheses () and displays it.

Other uses of disp

- DISP can also take numbers as inputs, and will output the number to the screen.
  ```matlab
  >> disp(10)
  ```
- Note: The >> is called the command prompt and is where you type commands. You do not type “>>”

A second function

- RAND is another function which, when used without inputs, produces a scalar value between 0 and 1.
  ```matlab
  >> rand
  ```

An operator

- In addition to commands, MATLAB has operators that output some sort of result.
- The operator * multiplies whatever precedes it (numeric class) by whatever follows it, and outputs the result.
  ```matlab
  >> 10 * 3
  ```

Order of operations

- Matlab arithmetic follows order of operations:
  ```matlab
  >> 2+3*4
  ```
  ```matlab
  >> (2+3)*4
  ```
- Note: In American English (which Matlab uses) parentheses are ( while brackets are [}
Putting it together

• Using order of operations, the operator * and the functions DISP and RAND,

\[ \text{>> disp(10*rand)} \]

Matlab interface

Trying it out...

Command Window

\[ \text{>> disp('Hello world!') }\]
\[ \text{Hello world!} \]
\[ \text{>> disp(10) }\]
\[ \text{10} \]
\[ \text{>> disp(10*rand) }\]
\[ \text{5.4698} \]

\[ \text{f_2 >> |} \]

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Errors (1)!

Command Window

\[ \text{>> disp(10*rand) }\]
\[ \text{5.4698} \]
\[ \text{>> disp('Hello world!) }\]
\[ \text{??? disp('Hello world!) }\]
\[ \text{Error: A MATLAB string constant is not terminated properly.} \]
\[ \text{f_2 >> |} \]

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Errors (2)!

Command Window

\[ \text{>> disp('Hello world!) }\]
\[ \text{??? disp('Hello world!) }\]
\[ \text{Error: A MATLAB string constant is not terminated properly.} \]
\[ \text{>> disp('Hello world!) }\]
\[ \text{??? disp('Hello world!) }\]
\[ \text{Error: Expression or statement is incorrect—possibly unbalanced }, \\text{ or } \{}
\[ \text{f_2 >> |} \]

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Errors (3)!

Command Window

\[ \text{>> disp('Hello world!) }\]
\[ \text{??? disp('Hello world!) }\]
\[ \text{Error: Expression or statement is incorrect—possibly unbalanced }, \\text{ or } \{}
\[ \text{>> disp('Hello world!) }\]
\[ \text{??? Undefined function or method 'disp' for argument of type 'char'.} \]
\[ \text{f_2 >> |} \]

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RAND errors

Command Window

\[ \text{>> rand} \]
\[ \text{kns =} \]
\[ 0.7491 \]
\[ \text{>> rand(2)} \]
\[ \text{kns =} \]
\[ 0.5822 \quad 0.1713 \]
\[ 0.6955 \quad 0.3068 \]
\[ \text{>> rand(4x)} \]
\[ \text{??? Error using rand Disallowed command option.} \]
\[ \text{f_2 >> |} \]

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Review

• A computer program is a list of steps required to do something.
• A function is a command that takes inputs inside parentheses, and operator acts on the quantities to either side of it.
• Errors are what you get when Matlab can’t interpret what you’ve told it to do.