Matlab as a fancy calculator

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Lecture 02

Matlab variable types

- integer
  - 123, -345, 0
- real or float
  - 12.2344
  - 5.445454
  - engineering notation
    - `4.2323e-9` $= 4.2323 \times 10^{-9}$
- complex
  - $i = \sqrt{-1} =$ `1i`
  - `34.23+21.21i`
  - `(1+1i)*(1-1i) = 2`
- strings (put your words inside apostrophes)
  - handy for file names and messages
  - `'programming is fun'`
  - `s='Williamsburg'`

Some built in constants and functions

- $\pi = 3.14159265358979323846264338327950 2 \cdots$
  - use `pi`
- trigonometry functions
  - `sin` , `cos` , `tan` , `cot`
  - `asin` , `acos` , `atan` , `acot`
- hyperbolic functions
  - `sinh` , `cosh` , `tanh` , `coth`
  - `asinh` , `acosh` , `atanh` , `acoth`
- logarithms
  - natural `log`
  - base of 10 `log10`
- power
  - x^y use `x^y` or alternatively `power(x,y)`
  - e^y use `exp(y)`

Assignment operator

```
x = 1.2 + 3.4
```

Despite the look `=` is not an equality operator.
`=` is an assignment operator.
The expression above should be read as

- evaluate expression at the right hand side of equality symbol
- assign the result of the RHS to the variable on the left hand sign
- now variable `x` holds the value `4.6`

We are free to use the **value** of the variable `x` in any further expressions

```
> x + 4.2
ans = 8.8
```

Efficient editing - Tab-completition

Once you typed some expressions in “Command window”

- type couple of first symbols of variable or function name
- hit tab and you will get
  - either fully typed name (if it is uniq)
  - or little chart with choices
    - use <up> or <down> arrows to choose
    - alternatively <Ctrl-p>, <Ctrl-n>
    - then hit <enter> to make your choise

Help related commands

These are the most important commands

- `docsearch word`
  - will search for `word` in the help files and show up matched help files
  - example: `docsearch trigonometry`
- `help name`
  - output short help text into “Command window” about function/method named `name`
  - example: `help sin`
- `doc name`
  - show a reference page about function/method named `name` in the help vrowser
  - usually has more information compare to `help name`
  - example: `doc sin`

Operator Precedence

Look at the following Matlab expression

```
-2^4*5 + tan(pi/8+pi/8)^2
```

Guess the answer.

```
- (2^4)*5 + (tan( (pi/8+pi/8) ))^2
```

```
- (16)*5 + (tan( (pi/4) ))^2
```

```
-80 + (1)^2 = -80 + 1= -79
```

Rule of thumb: if not sure use extra parentheses ()

- Read more by executing `doc precedence`
- or searching for 'precedence' in the help browser.