Goals of this section

• Learn to handle variables and arithmetic calculations
  - Naming of variables
  - Calculations
  - Using assignment statements
  - Display/Printing
Matlab Windows (review)

- Command: interactive
- Command history: track all used commands
- Workplace: type, name, size of variables
- Current directory: list all files in a folder
- Editor: program
- Figure: later
Variable Names (review)

- First character in identifier
  - a to z, A to Z
- Other characters in identifier
  - a to z, A to Z, _, or 0 (zero) to 9
- Matlab is case sensitive so A is different than a
- Use variable names that make sense, e.g., area_of_circle, may be shortened to area but x would not be very descriptive.
- Maximum length 63 characters
- Several key words cannot be used since compiler will be confused (e.g. function, case, i, j) - see page 19
- Blanks are not allowed in an identifier
- Mixing of 0’s and O’s or l’s and 1’s should be avoided-difficult to distinguish-just like if you have 1 in your email address
Definitions - Arithmetic Operation

- Arithmetic expression – a formula for computing a value, e.g. $5 \times 6^y, \sin(x)/\pi$
- Operand – variable such as x or y, constant such as pi, or anything that represents a value such as a function. *What is involved in the operation.*
- Operator – operates on the variables such as addition, subtraction etc. *What kind of operation.*
- Types of operators: ( ), ^, *, /, +, -, =
- Most of these operators are fairly self-explanatory
- Let’s practice the ones that are not: ^, *, =
## Arithmetic Operators: Symbols

(p22-22)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Symbol</th>
<th>Matlab example</th>
</tr>
</thead>
<tbody>
<tr>
<td>parentheses</td>
<td>( )</td>
<td>(a+2)*pi</td>
</tr>
<tr>
<td>exponentiation</td>
<td>^</td>
<td>a^b</td>
</tr>
<tr>
<td>multiplication</td>
<td>*</td>
<td>a*b</td>
</tr>
<tr>
<td>division</td>
<td>/</td>
<td>a/b</td>
</tr>
<tr>
<td>addition</td>
<td>+</td>
<td>a+b</td>
</tr>
<tr>
<td>subtraction</td>
<td>-</td>
<td>a-b</td>
</tr>
<tr>
<td>assignment</td>
<td>=</td>
<td>x=a+2</td>
</tr>
</tbody>
</table>
Assignment Statement (review)

• Check out the statement:
  \[ k = k + 1 \]
• This does not make sense in strict mathematical terms (i.e. if \( k = 2 \) we cannot say \( 2 = 3 \))
• However, this does work in Matlab since the computer calculates what is on the right side of the = sign and then places that value into the memory location for \( k \)
• For example, if \( k = 2 \) before the statement was executed the RHS would yield 3, and then this would be put into the LHS, so after execution of the statement \( k \) would be equal to 3
• NOTE: we **cannot** use:
  \[ \gg k + 1 = k \]  % this is wrong
  *need a single operand with no operators on the LHS*
## Basic Functions (p 68 & 76)

<table>
<thead>
<tr>
<th>Operation</th>
<th>Symbol</th>
<th>(MATLAB is case sensitive)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute value</td>
<td>abs ( )</td>
<td></td>
</tr>
<tr>
<td>Square root</td>
<td>sqrt ( )</td>
<td></td>
</tr>
<tr>
<td>Sign return</td>
<td>sign ( )</td>
<td></td>
</tr>
<tr>
<td>-1 if x&lt;0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 if x=0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 if x&gt;0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trigonometric functions</td>
<td>sin( ), cos( ), tan( ), asin( ), etc</td>
<td>input: radian not degree</td>
</tr>
</tbody>
</table>
Arithmetic Operations (1)

➢ Simply enter:

```plaintext
>> x=pi/2
x =
    1.5708

>> x
x =
    1.5708

>> pi/4
ans =
    0.7854

>> a1
??? Undefined function or variable 'a1'.
```
Arithmetic Operations (2)

- Can use ‘ans’ and other variables with values:

```matlab
>> x=pi/2
x =
  1.5708
>> y=x+2
y =
  3.5708
>> z=sin(x)
z =
  1
>> 8/10
ans =
  0.8000
>> 10*ans
ans =
  8
```
Display Format
(p 42-42)

➢ Format long
➢ Format short (default)
➢ Format bank
➢ Format loose (default)
➢ Format compact (save paper, save trees)
➢ Scientific notation: large and small numbers
e.g. 1.23e-234, 1.23e+234, 1.23e234
➢ Display formats will not change the ways
numbers stored in memory
Printing in Matlab

- Command window:
  File (or right click in Command Window)
  print
  choose one of 4 printers
  choose the printing job (ID of your PC)
  pay
Your Tasks

• Read Chapter 2
• Download notes from website and print
• Do quiz L2 (on screen and CLEW under Quiz), hardcopy due at the end of your session
• Register in a lab
• Not registered in any labs, go to Lab 53