

# Using Matlab for Complex Arithmetic

- Complex numbers are represented in rectangular form. Either **i** or **j** maybe used to represent the imaginary part but the **i** or **j** must follow the imaginary part.
  - > 5+5i
  - > 10-5j
- The polar form may be calculated by using the **abs ( )** function for the magnitude and the **angle ( )** function for the angle. The angle function returns a value in radians. Radians can be converted to degrees by multiplying by  $180/\pi$ . The constant  $\pi$  is represented by **pi**.
  - > abs (5+5i) = 7.0711
  - > angle (10-5j) = -0.4636
  - > (180/pi) \* angle (10-5j) = -26.5651
- Addition, subtraction, multiplication, division and exponentiation are performed with the following operators: **+**, **-**, **\***, **/** and **^** respectively.
- A matrix is denoted by square brackets **[ ]**. Elements are entered in column order by row. Within a row individual elements are delimited by commas or spaces. Rows are delimited by semicolons.
  - > A = [0.2+0.1i, 0.1-0.1i, 0; 0.1, 0, 1;1, -1, 10]
- A column vector is a matrix with one entry per row.
  - > b = [1; 1; 0]
- The solution of the matrix equation  $Ax = b$  can be found using the matrix inverse function **inv ( )** or the left divide operator **\**.
  - > x = inv (A) \* b
  - > x = A \ b

In either case:

- > x = [2+4i; 10; 0.8-0.4i]