Useful Matlab Commands

- **help plot**: gives help on the command `plot`.
- `t=-5:0.01:5`: this generates a vector with elements from -5 to 5, with a stepsize of 0.01.
- `x=cos(t)`: this generates a vector of values of cos corresponding to the values of `t` in the vector `t`.
- `plot(t,x)`: plot the cos-function.
- `z=3+1j*5` or `z=3+5j`: The complex number `z = 3 + 5i`.
- `abs(z),angle(z)`: modulus and phase of the complex number `z`.
- `A=[1,2;1+2j,0]`: Generates the matrix `A = \[
  1 & 2 \\
  1 + 2j & 0
\]`.
- `x=A\b`: Solves the linear equation `Ab = x`.
- `freqs`: Plots frequency response of a circuit versus frequency. See `help freqs` for details. Notice that the frequency response has to be expressed as a rational functions of `s = j\omega`. So, for example a term \(\omega^2\) this has to rewritten as \(-(j\omega)^2 = -s^2\).
- `residue`: partial fraction expansion.

Partial fraction expansion with complex poles

The following addtional Laplace table entries are useful

\[
\begin{align*}
  f(t) &= 2|k|e^{-at}\cos(\omega t + \phi) \\
  \downarrow \\
  F(s) &= \frac{k}{s + a - j\omega} + \frac{k^*}{s + a + j\omega}, \quad k = |k|e^{j\phi}
\end{align*}
\]

and

\[
\begin{align*}
  f(t) &= 2|k|\frac{t^n}{n!}e^{-at}\cos(\omega t + \phi) \\
  \downarrow \\
  F(s) &= \frac{k}{(s + a - j\omega)^{n+1}} + \frac{k^*}{(s + a + j\omega)^{n+1}}, \quad k = |k|e^{j\phi}
\end{align*}
\]