Obtain both analytically and computationally the unit step response of the following order systems:

$$\frac{C(s)}{R(s)} = \frac{3s^3 + 25s^2 + 72s + 80}{s^4 + 8s^3 + 40s^2 + 96s + 80}$$

R(s) is a unit step function;

$$C(s) = \frac{3s^3 + 25s^2 + 72s + 80}{s^4 + 8s^3 + 40s^2 + 96s + 80} \cdot \frac{1}{s}$$

$$\vdots$$

$$= \frac{-0.5626(s+2)}{(s+2)^2 + 4^2} + \frac{(0.3438)\,4}{(s+2)^2 + 4^2} - \frac{0.4375}{s+2} - \frac{0.375}{(s+2)^2} + \frac{1}{s}$$

$$c(t) = -0.5626e^{-2t}\cos 4t + 0.3438e^{-2t}\sin 4t - 0.4375e^{-2t} - 0.375e^{-2t} +$$

Handcoding;

$$[r, p, k] = \text{residue}(num, den)$$

Find the residues (r), poles (p), and direct terms (k) of a partial fraction expansion of the ratio of two polynomials B(s) and A(s):

$$\frac{B(s)}{A(s)} = \frac{r(1)}{s - p(1)} + \frac{r(2)}{s - p(2)} + \cdots + k(s)$$