4.1 Basic MIMO Concepts

$$y = (I + PCH)^{-1}PCr$$
$$L_o = PC$$
$$S_o = (I + L_o)^{-1}$$
$$T_o = L_o(I + L_o)^{-1}$$
$$S_o(s) + T_o(s) = I$$

The *minor* of a matrix is the determinant of any square submatrix obtained by deleting certain row's and/or columns of the matrix

The *rank* of a matrix is the max number of linearly independent column/row vectors.

To find $\phi(s)$, find all the minors. 1st order is just the element, while second order is as described above. Find the lowest common denominator of all non-zero minors.

A MIMO system is stable iff all the individual elements of the system are stable, and if all MIMO system poles are in the OLHP

The zero polynomial $z(s)$ is the greatest common divisor of all the r-th order minors. Steps:

1. Find the minors for the MIMO system

2. Determine $\phi(s)$

3. Make each minor as a fraction over $\phi(s)$

4. Find the GCD of the r-th order minors.