

1. If A and B are square matrices and B is invertible, show that $I - BA$ is invertible if $I - AB$ is invertible. Hint: $B(-AB) = (-BA)B$.
2. Let P be the plane in 3-space \mathbf{R}^3 with equation $x + 3y + z = 6$. What is the equation of the plane P_0 through the origin parallel to P ? Are P and P_0 subspaces of \mathbf{R}^3 ?
3. Consider the linear system $Ax = b$, where

$$A = \begin{bmatrix} 1 & 3 & 3 & 2 \\ 2 & 6 & 9 & 7 \\ -1 & -3 & 3 & 4 \end{bmatrix}, \quad x = \begin{bmatrix} u \\ v \\ w \end{bmatrix}, \quad b = \begin{bmatrix} 1 \\ 5 \\ 5 \end{bmatrix}.$$

- (a) Reduce A to the row echelon U and reduce U to the reduced row echelon form R .
- (b) Find the rank r of A .
- (c) Find basis vectors for the row space $R(A)$ by using the result of (a).
- (d) Find basis vectors for the null space $N(A)$.