MA 573 - Linear Algebra

Homework 3

Problem 1 [25 pts]

Construct a matrix whose nullspace consists of all combinations of $\begin{bmatrix} 2 \\ 2 \\ 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 3 \\ 1 \\ 0 \\ 1 \end{bmatrix}$.

Problem 2 [25 pts]

Construct a matrix whose column space contains $\begin{bmatrix} 1 \\ 1 \\ 5 \end{bmatrix}$ and $\begin{bmatrix} 0 \\ 3 \\ 1 \end{bmatrix}$ and whose nullspace contains $\begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$.

Problem 3 [25 pts]

Bring the following matrix in Row Reduced Echelon Form:

$$A = \begin{bmatrix} 1 & 2 & 5 & 0 & 5 \\ 3 & 1 & 15 & 2 & 2 \\ 2 & 0 & 4 & 3 & 2 \end{bmatrix}$$

Problem 4 [25 pts]

For which numbers c, d does the following matrix have rank 2?

$$A = \begin{bmatrix} 1 & 2 & 5 & 0 & 5 \\ 0 & 0 & \mathrm{c} & 2 & 2 \\ 0 & 0 & 0 & \mathrm{d} & 2 \end{bmatrix}$$