Q4: Riddhiman Roy: royridd1

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a) Rank A = 3 since there are infinitely many solution. with 1 free variable; if there was only 1 solution, Rank would be 4.

b) RNF(A) = R

$$P\vec{v} = 0$$

$$\begin{bmatrix} 1 & 0 & -2 & 0 \\ 0 & 1 & -3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} x_3 \begin{bmatrix} 2 \\ 3 \\ 1 \\ 0 \end{bmatrix} = \vec{0}$$

↳ replacing the values in Column 3 to match the corresponding equation to get $\vec{0}$.

3rd column since x_3 is the free variable.

$$R = \begin{bmatrix} 1 & 0 & -2 & 0 \\ 0 & 1 & -3 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

c) There is one free variable and R is less than full rank, meaning there is infinitely many solutions for any $\vec{b}$.