Exercise 2.74: Matrix Properties and System Solvability

(Penney, 4th edition, p.145.)

1. Each row of the table indicated in Figure 2.3 summarizes data collected for some matrix *A*. The "always solvable" column refers to whether the system $AX = B$ is solvable for all B and the "unique solution" column refers to whether or not there is at most one solution. Your assignment is to fill in all the missing data from the table. Where the data is inconsistent, write "impossible."

Figure 2.3, Exercise 2.74: properties of eight matrices, with the missing entries filled in (filled-in entries are in bold)

Size	Always Solvable	Unique Solution	Dimension of Column Space	Dimension of Nullspace	Rank
4×3	yes	**impossible**	**impossible**	**impossible**	**impossible**
3×4	yes	**no**	**3**	**1**	**3**
5×5	**no**	**no**	**4**	1	**4**
5×5	**yes**	**yes**	5	**0**	**5**
3×2	**no**	yes	**2**	**0**	**2**
4×4	yes	**yes**	**4**	**0**	**4**
5×4	**no**	**no**	**3**	**1**	3
5×4	**impossible**	**impossible**	**impossible**	**impossible**	5