A Matrix's Rank and Calculating Inverse Matrices- HW Problems

In problems 1-6 find the rank of the matrix.

1. $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$

2. $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 0 & 1 \\ 3 & 4 & 6 \end{bmatrix}$

3. $\begin{bmatrix} 2 & 1 & 3 \\ 4 & 2 & 3 \end{bmatrix}$

4. $\begin{bmatrix} 2 & 1 & 2 & 2 \\ 2 & 3 & 2 & 3 \\ 1 & 1 & 1 & 1 \end{bmatrix}$

5. $\begin{bmatrix} 1 & 2 & 1 & 0 \\ 1 & 5 & 4 & 3 \\ 1 & 3 & 2 & 1 \\ 1 & 4 & 3 & 2 \end{bmatrix}$

6. $\begin{bmatrix} 3 & 2 & 2 & 3 & 2 \\ 3 & 3 & 3 & 3 & 3 \\ 6 & 4 & 5 & 6 & 4 \\ 1 & 1 & -1 & 1 & 1 \end{bmatrix}$

7. Use elementary row and column operations to transform the matrix A into the form

$$B = \begin{bmatrix} I & 0_1 \\ 0_2 & 0_3 \end{bmatrix}, \text{ where } 0_1, 0_2, \text{ and } 0_3 \text{ are zero matrices.}$$

$$A = \begin{bmatrix} 1 & 2 & 2 & 2 \\ 2 & 7 & 4 & 6 \\ 1 & -1 & 2 & 0 \end{bmatrix}.$$

For problems 8-12 calculate the inverse of the matrix by the method shown in class.

8. $\begin{bmatrix} 1 & 2 \\ 3 & 7 \end{bmatrix}$

9. $\begin{bmatrix} 2 & 1 \\ 7 & 4 \end{bmatrix}$

10. $\begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$

11. $\begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \\ 1 & 0 & 2 \end{bmatrix}$

12. $\begin{bmatrix} 1 & 0 & 1 \\ 3 & 3 & 4 \\ 2 & 2 & 3 \end{bmatrix}$

13. Let $v_1 =< 2, 1, -1 >$, $v_2 =< -1, 2, 4 >$, $v_3 =< -1, 7, 11 >$, $v_4 =< 1, 3, 3 >$, and $v_5 =< 1, -2, 3 >$. You can assume that $v_1, \dots, v_5$ spans $\mathbb{R}^3$. Find a subset of $v_1, \dots, v_5$ that forms a basis for $\mathbb{R}^3$.