Show your work. Answers with no work receive no credit.

2. Use the matrices given to answer the following arithmetic problems. If a problem cannot be solved, explain why it cannot be solved.

$$A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 3 \\ 4 & 8 & 1 \end{bmatrix} \qquad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \qquad B = \begin{bmatrix} 5 \\ 6 \\ 7 \end{bmatrix} \qquad C^{-1} = \begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 8 & 9 & 0 \end{bmatrix}$$

(a) A^{-1}

$$\left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & 3 & 0 & 1 & 0 \\ 4 & 8 & 1 & 0 & 0 & 1 \end{array}\right] \xrightarrow{R_3 - 4R_1} \left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & 3 & 0 & 1 & 0 \\ 0 & 0 & 1 & -4 & 0 & 1 \end{array}\right] \xrightarrow{R_2 - 3R_3} \left[\begin{array}{ccc|ccc} 1 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 12 & 1 & -3 \\ 0 & 0 & 1 & -4 & 0 & 1 \end{array}\right]$$

$$\xrightarrow{R_1 - 2R_2} \left[\begin{array}{ccc|ccc} 1 & 0 & 0 & -23 & -2 & 6 \\ 0 & 1 & 0 & 12 & 1 & -3 \\ 0 & 0 & 1 & -4 & 0 & 1 \end{array}\right]$$

$$A^{-1} = \begin{bmatrix} -23 & -2 & 6 \\ 12 & 1 & -3 \\ -4 & 0 & 1 \end{bmatrix}$$

(b) If $CX = B$, then find X explicitly. $X = C^{-1}B$, ~~but~~ and we have C^{-1} and B already

$$\underset{X}{\begin{bmatrix} x \\ y \\ z \end{bmatrix}} = \underset{C^{-1}}{\begin{bmatrix} 2 & 3 & 4 \\ 5 & 6 & 7 \\ 8 & 9 & 0 \end{bmatrix}} \underset{B}{\begin{bmatrix} 5 \\ 6 \\ 7 \end{bmatrix}} = \begin{bmatrix} 2(5) + 3(6) + 4(7) \\ 5(5) + 6(6) + 7(7) \\ 8(5) + 9(6) + 0(7) \end{bmatrix} = \begin{bmatrix} 10 + 18 + 28 \\ 25 + 36 + 49 \\ 40 + 54 + 0 \end{bmatrix} = \begin{bmatrix} 56 \\ 110 \\ 94 \end{bmatrix}$$

$3 \cdot 3 = 3 \times 1$

answer is 3×1

$x = 56, \quad y = 110, \quad z = 94$

$$X = \begin{bmatrix} 56 \\ 110 \\ 94 \end{bmatrix}$$