

KEY

Instructions: Show all work. Problem should be completed by hand, though you may check your answers in a calculator. Answers with no work will receive minimal credit. Be sure to complete all parts of the problem, and use exact answers.

1. For each part below, refer to the system given by
$$\begin{cases} 2x_1 - 3x_2 + x_3 = -1 \\ 5x_1 + 7x_3 = 9 \\ -8x_1 + 6x_2 - 4x_3 = 2 \end{cases}$$

- a. Write the system as an augmented matrix.

$$\left[\begin{array}{ccc|c} 2 & -3 & 1 & -1 \\ 5 & 0 & 7 & 9 \\ -8 & 6 & -4 & 2 \end{array} \right]$$

- b. Write the system as a vector equation.

$$x_1 \begin{bmatrix} 2 \\ 5 \\ -8 \end{bmatrix} + x_2 \begin{bmatrix} -3 \\ 0 \\ 6 \end{bmatrix} + x_3 \begin{bmatrix} 1 \\ 7 \\ -4 \end{bmatrix} = \begin{bmatrix} -1 \\ 9 \\ 2 \end{bmatrix}$$

- c. Solve the system. You may use the back of the page for most of the work.

Steps will vary

$$\vec{x} = \begin{bmatrix} -1 \\ 1/3 \\ 2 \end{bmatrix}$$

- d. State whether the solution is consistent or inconsistent and dependent or independent, if applicable.

Consistent
independent

- e. If the system is dependent, write the reduced system here and note the free variable. If the system is independent, write the solution as a column vector.

$$\vec{x} = \begin{bmatrix} -1 \\ 1/3 \\ 2 \end{bmatrix}$$