Ex 1 Which of the following are linear systems of equations?

(a)
$$x = 1$$
$$y = 2$$

(b)
$$x = 1$$
$$xy = 2$$

(c)
$$2x + 3y = -1$$
$$\pi x - y = 4$$

(d)
$$6x + 3y$$
$$-8x + 2y$$

(e)
$$5x + 2 = 3y$$
$$-3 + 2y = x$$

Ex 2 Solve the following system of linear equations in two different ways.

$$8x + 2y = 9$$
$$-2x - 4y = 1$$

Ex 3 What system of linear equations does the following augmented matrix represent?

$$\left(\begin{array}{ccccc|c} 2 & 3 & 4 & 5 & 6 & 7 \\ -1 & 0 & 0 & -2 & 5 & -5 \\ 0 & 0 & 1 & 3 & -99 & 0 \end{array} \right)$$

Ex 4 Consider the following system of linear equations:

$$3x - 5y + z = 2$$
$$9z + 2x - 1 = 3y$$
$$-25x + 42y = -17$$

(a) Write the system as an augmented matrix.

(b) Put the augmented matrix from the first part in row-echelon form.

(c) Put the row-echelon matrix from the previous part in reduced row-echelon form.

(d) Completely classify the solutions to the system of equations.

Ex 5 Create a linear system of equations with the specified properties OR explain why such a task is impossible.

(a) Two variables, one unique solution

(b) More equations than variables, more than one variable, consistent

(c) More equations than variables, more than one variable, inconsistent

(d) More variables than equations, inconsistent

(e) More variables than equations, one unique solution

(f) Homogeneous with more than one variable, one unique solution

(g) Homogeneous with more than one variable, no solutions