HANDOUT 2

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- Recapture:
  Augmented matrix, elementary row operations, pivot, Row Echelon form (REF), Reduced Row Echelon Form (RREF)
- Solving systems of linear equations:
  Elimination of variables $\Leftrightarrow$ transforming the augmented matrix into Reduced Row Echelon Form.
- When is a system of equation consistent?

Some exercises: (challenging problems will be marked by *)

1. Solve the following system of equations:
   (1) $y + z = 3, x + y = 2, 2x + 3y + 4z = 13$.
   (2) $x_1 - 2x_2 - x_3 = 2, 3x_1 - 4x_2 - x_3 = 2$.
   (3) $x_1 + 2x_2 - x_3 + 3x_4 = 2, 2x_1 + 4x_2 - x_3 + 6x_4 = 5, x_2 + 2x_4 = 3$.
2. When is the following system of equations (in x, y) consistent?

$$x + hy = 4, \qquad 3x + 6y = 8.$$

3*. Determine the value(s) of h such that the following is the augmented matrix of a consistent linear system:

$$\left(\begin{array}{cc|c} h & 1 & -2 \\ 4 & h & 4 \end{array}\right)$$

Solutions:

1.

(1) $$x = 1, y = 1, z = 2.$$

(2) $$\begin{cases} x_1 + x_3 = -2 \\ x_2 + x_3 = -2 \end{cases}$$

(3) $$\left(\begin{array}{cccc|c} 1 & 0 & 0 & -1 & -3 \\ 0 & 1 & 0 & 2 & 3 \\ 0 & 0 & 1 & 0 & 1 \end{array}\right)$$

2. $h \neq 2$
3. $h \neq 2$