

Math 54: Worksheet

January 22

Mark the boxes that correspond to possible scenarios, i.e., if there exists a linear system with more equations than unknowns and no solutions, then mark the corresponding box. If there does not exist such a linear system, leave the box blank.

	inconsistent	consistent	
	no solutions	exactly one solution	infinitely many solutions
# eq. > # unknowns			
# eq. = # unknowns			
# eq. < # unknowns			

Questions

- (1) In words, how does one go about determining how many solutions a linear system has (without solving it fully)?
- (2) For what values of h is the matrix $\begin{bmatrix} 1 & h & -3 \\ -2 & 4 & 6 \end{bmatrix}$ the augmented matrix of a consistent linear system?
- (3) Put the following matrices into reduced echelon form, and give the solution set of the corresponding linear system (i.e., the linear system whose augmented matrix is the given matrix).

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

$$\begin{bmatrix} 1 & -7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ -1 & 7 & -4 & 2 & 7 \end{bmatrix}$$

$$\begin{bmatrix} 4 & 3 & 2 & 1 & 0 \\ 9 & 8 & 7 & 6 & 5 \\ 14 & 13 & 12 & 11 & 10 \\ 20 & 18 & 17 & 16 & 15 \end{bmatrix}$$

- (4) **True or false:** If one row in an echelon form of an augmented matrix is
$$[0 \ 0 \ 0 \ 2 \ 0],$$
then the associated linear system is inconsistent.
- (5) **True or false:** If the last column of the augmented matrix of a linear system is a pivot column, then the system is inconsistent.
- (6) If a linear system is consistent, then the solution is unique if and only if _____.
(Fill in the blank with something about pivot columns.)
- (7) **Always/sometimes/never:** A consistent linear system with more unknowns than equations _____ has infinitely many solutions.