*Assignment 4 (Final Version)*

**Due Monday in Class**

**1.** Section 1.2, Exercises 17 and 18. Be sure to show your work and justify your answers. Review the answers to a similar question on the Day 2 Assignment.

**2.** Section 1.2, Exercise 20. Be sure to show your work/reasoning. Hint: Which Theorem is helpful?

**3.** Section 1.2, Exercise 24. Be sure to justify your answer.

**4.** For each of the following, decide whether or not it is possible for a system to satisfy the given description. If it is possible, give an augmented matrix (in row-echelon or reduced row-echelon form) that corresponds to such a system and prove that the corresponding system does in fact fulfill the requirements; if it is not possible, prove that it is not possible. Hint: Which Theorem is helpful.

(*a*) A system of 5 equations in 3 unknowns that has exactly 1 solution.

(*b*) A system of 5 equations in 3 unknowns that has infinitely many solutions.

(*c*) A system of 5 equations in 3 unknowns that has exactly 2 solutions.

**5.** Repeat Problem 3 for the following statements.

(*a*) A system of 3 equations in 5 unknowns that has infinitely many solutions.

(*b*) A system of 3 equations in 5 unknowns that has no solutions.

(*c*) A system of 3 equations in 5 unknowns that has exactly 1 solution.

**6.** Section **1.3**, Exercise 10. Easy, but important in the next section!

**7.** Prove part (vii) of the Algebraic Properties of $\mathbb{R}^n$ Theorem (p. 27). See the solution to Practice Problem 1 of Section 1.3 and the proof of (vi) from lecture (Friday, January 29th) for examples of how such a proof should go.

**8.** Consider the set $H = \left\{ \begin{bmatrix} 4 \\ -4 \\ 2 \end{bmatrix}, \begin{bmatrix} -8 \\ 7 \\ -1 \end{bmatrix}, \begin{bmatrix} 8 \\ -6 \\ -2 \end{bmatrix} \right\}$. Is the vector $\begin{bmatrix} -32 \\ 4 \\ -7 \end{bmatrix}$ in Span$(H)$? If it is, write it as a specific linear combination of the vectors in $H$.

**9.** Consider the set $H = \left\{ \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} -2 \\ 3 \\ -2 \end{bmatrix}, \begin{bmatrix} -6 \\ 7 \\ -5 \end{bmatrix} \right\}$. Is the vector $\begin{bmatrix} 11 \\ -5 \\ 9 \end{bmatrix}$ in Span$(H)$? If it is, write it as a specific linear combination of the vectors in $H$.