Homework Week 3

MATH 204: Linear Algebra
Due September 15, 2017 Name (Print): ____________________

Remember that although you may discuss this assignment with others, your write up should be your own. **Do not share your write-up, look at other's write-ups, discuss word for word how something should be proved, etc.** Be sure to note with whom you collaborate if you do collaborate.

1. **Curve Fitting Application**: Find the unique quadratic equation of the form $y = ax^2 + bx + c$ that goes through the points $(-2, 20)$, $(1, 5)$ and $(3, 5)$ in the xy-plane. (Hint: Create a system of equations with unknowns/variables a, b and c.) Isn't that cool!

2. 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. If it is not, explain.

3. 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. If it is not, explain.

4. Number 21 from Section 1.3, page 33. Your explanation should include reference to a Theorem to justify!

5. Number 26 from Section 1.3, page 33. Be sure to think about the questions and do not perform unnecessary calculations.

6. Number 12 from Section 1.4, page 41. Check your solution!

7. Number 14 from Section 1.4, page 41. Show your solution!

8. Ignore the instructions for this one! Instead, use the given A and $\mathbf{b}$ and describe the set of all $\mathbf{b}$ for which $A\mathbf{x} = \mathbf{b}$ has a solution. (Your description should be in the form of an equation involving b_1, b_2 and b_3.) Also, give a specific example of a $\mathbf{b}$ for which $A\mathbf{x} = \mathbf{b}$ does **not** have a solution, along with a few words of explanation. Number 16 from Section 1.4, page 41.

9. Find the value(s) of h for which $\mathbf{v} = \begin{bmatrix} -3 \\ h \\ -5 \\ 5 \end{bmatrix}$ is in Span$\left\{ \begin{bmatrix} -3 \\ -4 \\ 5 \\ -5 \end{bmatrix}, \begin{bmatrix} 0 \\ 2 \\ -4 \\ 2 \end{bmatrix}, \begin{bmatrix} 0 \\ 0 \\ 1 \\ -3 \end{bmatrix} \right\}$. Show your work.