# Matrix Equations

MATH 204: Linear Algebra
Prepare for class September 11, 2017 Name (Print): _____

After rereading Section 1.4, answer the following questions.

1. Fill in the blank two ways: The equation $A\mathbf{x} = \mathbf{b}$ has a solution if and only if $\mathbf{b}$ is

_____.

or _____.

2. Write down the statement of Theorem 3 on page 36. What does the text say is powerful about Theorem 3?

3. Up until this point we have been using the word "span" as a noun. In this section we start using it as a verb. Write two sentences, one that uses span as a noun and one that uses it as a verb.

4. Write down the statement of Theorem 4 on page 37.

5. Use Theorem 4 to answer this question. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$ and $\mathbf{x} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$. Is the equation $A\mathbf{x} = \mathbf{b}$ consistent for all possible $\mathbf{b}$? Hint: How many columns does $A$ have? What does this have to do with pivots?

6. Do the columns of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 0 & 3 & 9 \end{bmatrix}$ span $\mathbb{R}^3$? Explain.