

# Group Work: Spans and Matrix Equations

MATH 204: Linear Algebra

September 7, 2018

1. **Possible/Impossible:** Two different sets of vectors such that their spans have no intersection.

2. Suppose  $\mathbf{a}_1 = \begin{bmatrix} 1 \\ 4 \\ -2 \end{bmatrix}$  and  $\mathbf{a}_2 = \begin{bmatrix} -2 \\ -3 \\ 7 \end{bmatrix}$ . For what value(s) of  $h$  is  $\mathbf{b} = \begin{bmatrix} 4 \\ 1 \\ h \end{bmatrix}$  in  $\text{Span}\{\mathbf{a}_1, \mathbf{a}_2\}$ ?

After your group finishes question 2, review your reading sheet for today together and then move on to the following questions.

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

4. Use Theorem 4 to answer this question. Let  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$  and  $\mathbf{b} = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \end{bmatrix}$ . 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?

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