

1. Let  $A = \begin{bmatrix} 2 & 0 & -1 \\ 3 & 1 & -2 \\ -1 & 1 & 0 \\ 5 & -1 & -2 \end{bmatrix}$ , and  $\mathbf{b} = \begin{bmatrix} h \\ k \\ \ell \\ m \end{bmatrix}$ .

- a. Find the equation(s) that the entries of  $\mathbf{b}$  must satisfy in order that the equation  $A\mathbf{x} = \mathbf{b}$  be consistent. Give your answer here, but show your work below.
- b. Identify the pivot columns of  $A$ . Write the general form of a vector in the span of the **pivot columns** of  $A$ .

c. Write  $\mathbf{b} = \begin{bmatrix} 4 \\ 5 \\ -3 \\ 11 \end{bmatrix}$  as a linear combination of the columns of  $A$ .