1. Let $A = \begin{bmatrix} 1 & 3 & 5 \\ -2 & -6 & 7 \end{bmatrix}$.

   (a) Find all solutions to the homogeneous system $A\vec{\mathbf{x}} = \vec{\mathbf{0}}$.

   (b) Find all solutions to $A\vec{\mathbf{x}} = \vec{\mathbf{b}}$ where $\vec{\mathbf{b}} = \begin{bmatrix} -3 \\ 9 \end{bmatrix}$.

2. Find all solutions to $A\vec{\mathbf{x}} = \vec{\mathbf{b}}$ where

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \\ 4 & 8 & 7 & 11 \end{bmatrix} \text{ and } \vec{\mathbf{b}} = \begin{bmatrix} -9 \\ -13 \\ -31 \end{bmatrix}.$$