Math 18 **Homework 1** **Due January 17, 2020**

1. Find an equation involving a, b, and c that makes the following augmented matrix a consistent system:

$$\left[\begin{array}{ccc|c} 1 & -4 & 7 & a \\ 0 & 3 & -5 & b \\ -2 & 5 & -9 & c \end{array}\right]$$

2. Determine the set of all ordered pairs of numbers (h, k) for which the system

$$\begin{aligned} x_1 + hx_2 &= 2 \\ 4x_1 + 8x_2 &= k \end{aligned}$$

   (a) has no solution.

   (b) has a unique solution.

   (c) has infinitely many solutions.

3. Let $\mathbf{v}_1 = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}$, $\mathbf{v}_2 = \begin{bmatrix} -3 \\ 1 \\ 8 \end{bmatrix}$, and $\mathbf{y} = \begin{bmatrix} h \\ -5 \\ -3 \end{bmatrix}$.

   For what value(s) of h is $\mathbf{y}$ in the plane spanned by $\mathbf{v}_1$ and $\mathbf{v}_2$?

4. Let $A = \begin{bmatrix} 2 & 0 & 6 \\ -1 & 8 & 5 \\ 1 & -2 & 1 \end{bmatrix}$, let $\mathbf{b} = \begin{bmatrix} 10 \\ 3 \\ 3 \end{bmatrix}$, and let W be the set of all linear combinations of the columns of A.

   (a) Is $\mathbf{b}$ in W?

   (b) Show that the third column of A is in W.