1. Let $A = \begin{bmatrix} 3 & -6 & 6 & 24 \\ -5 & 10 & 3 & -1 \\ 7 & -14 & 1 & 17 \end{bmatrix}$. 1A) Let $\mathbf{u} = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \end{bmatrix}$. Use the "super-augmented" matrix technique developed in class to find any/all conditions on u_1, u_2, and u_3 that guarantee the matrix equation $A\mathbf{x} = \mathbf{u}$ is consistent. Show both the super-augmented matrix you use and its RREF.

1B) Show that the vector $\mathbf{v} = \begin{bmatrix} 21 \\ 30 \\ -16 \end{bmatrix}$ satisfies the condition(s) you found in (1A)

1C) Find all the solutions of $A\mathbf{x} = \mathbf{v}$ and express them in parametric vector form.

1D) What specific solution $\mathbf{s} = \begin{bmatrix} s_1 \\ s_2 \\ s_3 \\ s_4 \end{bmatrix}$ do you get for $A\mathbf{x} = \mathbf{v}$ if you set all the free variables in (1C) to 10?

1E) Find $A\mathbf{s}$ (do this product using your calculator and two of its matrices as shown in class) for the vector $\mathbf{s}$ in (1D). What do you get for $A\mathbf{s}$?