Span and Linear Independence

1. Write a function to determine if a vector b is in the span of a set of vectors S=v_1,v_2,...,v_n. For example: is [4,3,1]' in the span of [1,2,1]',[3,-2,6]',[5,0,0]'}?

   (a) Your function should have 2 inputs and 1 output. The inputs should be a Matrix A where the columns of A are the vectors in S and a vector **b**. The output should be the vector of constants **c**.

   (b) Remember that **b** is in span S if there are constants c_1, c_2,..,c_n such that **b** = $c_1 \cdot s_1$ + $c_2 \cdot s_2$ +...+ $c_n \cdot s_n$. You can create a matrix A where the columns are the vectors in S=v_1,v_2,...,v_n. Set up an augmented matrix to determine the constants.

   (c) If your program determines that **b** is in span S, output a vector of the constants **c**= [c_1, c_2, ..., c_n].

   (d) Check to see if your program works by making A = [[1,2,6]',[4,-3,1]',[9,0,4]'] and **b** = [35,13,29]'. The constants should be c_1=2, c_2=-3, and c_3=5. (Be careful creating the **A** matrix and **b** vector: Each vector inside **A** should be a **column** and **b** vector is also a column vector.)

2. Write a script to determine if the columns of a matrix are linearly independent. Your program should

   (a) Ask for the user to input a matrix.

   (b) Find the reduced echelon form of the matrix.

   (c) Print using fprintf whether the columns of the matrix are linearly independent or dependent using the result of part b.