Gordon Ng Assignment 2 CS 132

a) $p = \begin{matrix} 2 \\ -5 \end{matrix}$

$q = \begin{matrix} -3 \\ 1 \end{matrix}$

$x = \begin{matrix} 2 \\ -5 \end{matrix} + t(\begin{bmatrix} -3 \\ 1 \end{bmatrix} - \begin{bmatrix} 2 \\ -5 \end{bmatrix})$

$x = \begin{bmatrix} 2 \\ -5 \end{bmatrix} + t\begin{bmatrix} -5 \\ 6 \end{bmatrix}$

b) $p = \begin{bmatrix} -6 \\ 3 \end{bmatrix}$

$q = \begin{bmatrix} 0 \\ -4 \end{bmatrix}$

$x = \begin{bmatrix} 0 \\ -4 \end{bmatrix} + t(\begin{bmatrix} 0 \\ -4 \end{bmatrix} - \begin{bmatrix} -6 \\ 3 \end{bmatrix})$

$x = \begin{bmatrix} 0 \\ -4 \end{bmatrix} + t(\begin{bmatrix} 6 \\ -7 \end{bmatrix})$

2. The problem tells us that there is a zero row, where Ax = y doesn't have a solution, but spans IR. There is also two pivots.

3. Theorem 5 tells us that Au = 0 and Av = 0 is a zero vector when it becomes A(u+v). Au + Av is two zero vectors summed up.

4. a) False, if the **x** is trivial (not significant) to **A**x = 0, then x has non zero entries.

b) True, x2 and x3 are free variables and v and u can be any number (it specifies they are not multiples), so it could go through the origin. They are linear independent, every row has a pivot (two pivots). Both of them are not in the span of the other.

c) True, if zero vector is a solution, then **Ax** = **b,** will become **A**x = 0. Sets right hand side to zero.

d) True, a vector can be treated as a line which has a size depending on the vector and constant. You can move a point with that given vector, labeled as p.

5)

answer5.m

```
%ans =

%    1     0     3     0     0
%    0     1     8     0     0
%    0     0     0     1     0
%    0     0     0     0     1

%A =[12,10,-6,-3,7,10;-7,-6,4,7,-9,5;9,9,-9,-5,5,-1;-4,-3,1,6,-8,9;8,7,-5,-9,11,-8]

%A =
%   12    10    -6    -3     7    10
%   -7    -6     4     7    -9     5
%    9     9    -9    -5     5    -1
%   -4    -3     1     6    -8     9
%    8     7    -5    -9    11    -8

%rref(A)

%ans =

%    1     0     2     0     2     0
%    0     1    -3     0    -2     0
%    0     0     0     1    -1     0
%    0     0     0     0     0     1
%    0     0     0     0     0     0

%  Bx = 0 would only have pivots. so for
%a) it would be [[8,-3,7,2;-9,4,11,-7;6,-2,-4,4;5,-1,0,10] where column 3
%doesnt have a pivot.
%b) only colums 1, 2, 4 and 6 have pivots.
% the answer would be [12,10,-3,10;-7,-6,7,5;9,9,-5,-1;-4,-3,6,9;8,7,-9,-8]
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6.

a)
$$\begin{matrix} \blacksquare & * & * \\ 0 & \blacksquare & * \\ 0 & 0 & \blacksquare \end{matrix}$$

b) $\begin{matrix} \blacksquare & * \\ 0 & \blacksquare \end{matrix}$

c) $\begin{matrix} 0 & \blacksquare \\ 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{matrix}$

d) $\begin{matrix} \blacksquare & * & * \\ 0 & \blacksquare & * \\ 0 & 0 & \blacksquare \\ 0 & 0 & 0 \end{matrix}$

7. Theorem 5 describes $\mathbf{A}(c\mathbf{u}) = c(\mathbf{Au}) = c0$ where, $\mathbf{u}$ satisfies $\mathbf{Ax} = 0$. So they are all zero vectors