Homework #4(Week 5) Vector Spaces II – MSCA 32010

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1. U0 = R0 =

R0 \* X = 0 so Then x =

Check it by U\*x = 0

Uc = Rd =

Rd \* x = d so Then x =

Check it by U\*x = c

1. Yes it is true. If Ax = b = Cx, then Ax = Cx and we can say that A = C, for a given x
2. There can be 3 independent vectors

V2 = v1 + v4 and is not independent

V3 = v1 + v4 + v6 and is not independent

V5 = v4 + v6 and is not independent

That leaves us with 3 independent vectors, v1, v4 and v6.

You can also put the 6 vectors in a matrix and use Gauss Jordan elimination, which gives us 3 pivots, and 3 free variables, so we have 3 independent vectors.

4a. Basis for the plane x-2y+3z=0, we can use 2 special solutions to find a basis for this plane. Using (0,1) and (1,0) for y and z, we get

These two vectors form a basis for the plane.

4b. The intersection of the plane and the xy plane is a line. If we set z=0, x-2y = 0 -> y =x/2

Then this entire line, which passes through the origin forms the basis of the intersection. If we set x =2, a special solution would be

4c. If 2 vectors are perpendicular, then their dot product equals 0. Since the original equation, is a linear combination of 2 vectors (x, y, z) and (1,-2, 3) that equals 0. Then we can say that these two vectors are perpendicular. The Span of {1,-2,3} are all the vectors perpendicular to the plane. And the vector (1,-2,3) forms a basis for those vectors.