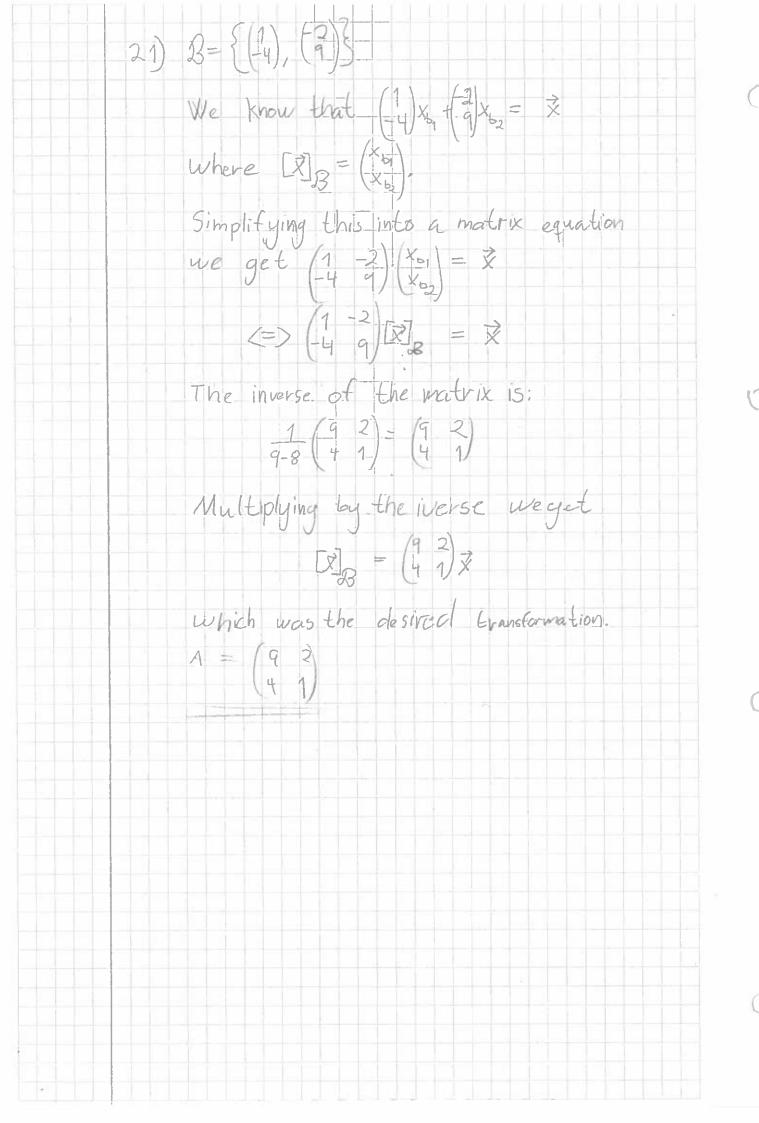
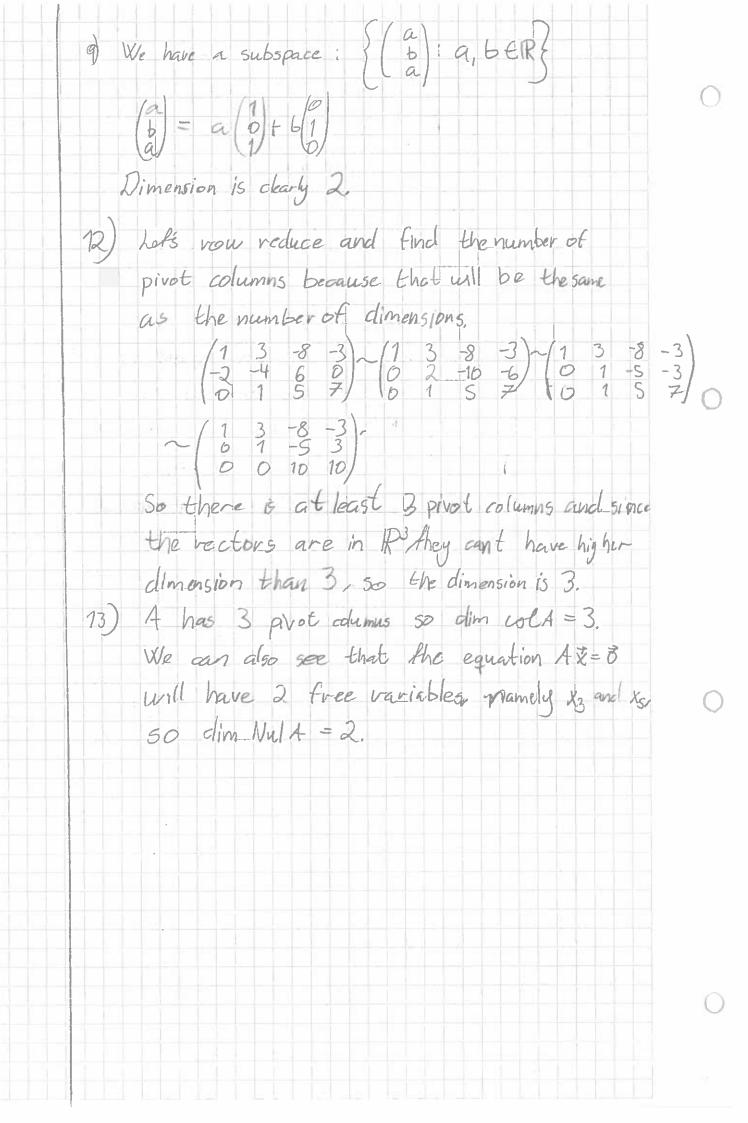
ving 1 -4 3 44 5 2 2 3 3. t /3-4 -12+7 -9/ -1 -5 9 \_\_ 3 -5 -1 2 6/ = (4+24-28 -3-40+49 0+16-21 0 1 -S = 8 1 -1 -3 7) Have Us Solve -3 + 9 2 -2 4 8 -1 30/ 2 0 10 1 -3 1 0 0 Ô -3 1 0 0 8 100 8-2-3-3 -1 3 3 1 100 001 010 100 0 0 1 -1 -1 3 010



1 + b -1 + C 1 1 2 at the vectors above are linearly indepotent the will form a basis. We'll check by solving an equation AZ = 3 0000 (O O 1 O 1 B 3 2030 0000  $(=) x - x_2 - 3x_3 -$ 2039 000 it has only the trivial solution which means the column vectors are independent. basis B is then given by: which has dimension 3.



21) 1, 2t, -2+4t<sup>2</sup>, -12t+8t<sup>3</sup> P3= { a+b++c+2+d+3:4b,c,dER3 The four polynomials written in vector form are  $\frac{1}{2} = \frac{1}{2} = \frac{1}{$ We want to show that span b, b, b, b, b, be cause then all polynomaials in R3 car be expressed in terms of these vectors

et A = (B | B) IF A x = B has a unique solution the column vectors are Inclependent. Using you reduction and amitting right hand side) 4 pivet columns span of columns is PH so they form a bas s of P3.

26) Let It be an n-dimensional subspace of an n-dimensional space V. H has a basis, B, of exactly n elements since His n-dimensional. Since HSV, the span B must be a subset (not proper) of V, but since B has exercitly n elements and V is n-dimensional, B must also be a basis for V. Since Hand V can be expressed with the same basis, and HEV, we conclude H=V.10 rank A = dem col A = dim col B = 3 4.6 =) rank A = B clim Nul A = 2 Basis for colA:  $\begin{cases}
 2 \\
 -2 \\
 4 \\
 -2
\end{cases}
\begin{pmatrix}
 6 \\
 -3 \\
 9 \\
 3
\end{pmatrix}
\begin{pmatrix}
 2 \\
 -3 \\
 5 \\
 -4
\end{pmatrix}$ Basis for row A:  $\begin{cases}
(2, -3, 6, 2, 5), \\
(0, 0, 3, -1, 1), \\
(0, 0, 0, 1, 3)
\end{cases}$ Basis for NulA: have to reduce Bto RREF 

From this we can see that -7x + 3x+ 3 x3 = -4x5  $+ x_{4} = -3x_{5}$ X1 - 3x2 - 2x5  $\langle = \rangle$ X2/X5 free can write  $\begin{array}{c|c}
X_5 \\
X_4 \\
X_5 \\
X_7 \\
X_7 \\
X_8 \\
X_8 \\
X_9 \\
X_9$ So We can write From this we see that is a basis of NulA. S) A is 3x8, rank A=3, 8 = rankA + dim Nul A =) clim Nul A = 8-3=S dim Row A = rank A = 3 rank AT = rank A = 3 7) A is 7x5 then A consists of S column vectors in Rt. If they are all independent, the rank of A is 5 which is the largest rank, · If A is Sx7 then A consists of 7 column vectors in Rs. At most 5 of the & vector can be Independent, so the largest rank of A is S.

14) . If A is 4x3 then the vow vectors care in 18°. Hindependent vectors in 18° can t span more than P so the largest row space dimension is 3 olf A is 3 x4 and all the 3 row vectors are independent, then dim Row += 3 which is the largest possible. 17) A is mxn c) True, because the row vectors of A are exactly the column vectors of A. b) False, imagine A as a matrix where the first three rows are all zero land the remaining row vectors are independent) Then the first three rows do not form a basis of Row A c) True, this dimension is just the rank cl) False, it equals number of columns e) True, this happens due to the inexact nature of digital storage and representation (round-off error. e-(c)

4.9 Healthy Ill To: a) .45 Healthy .55) Ill = (.80) heathy Monday 1.95 .45 1.80 = (.76+.09)=1.85 .05 .55/ 20/ (.04+.11/ .15) Tuesday: 85% healthy 15% ill x5 = (.95 .45) (.85) = (.8075+.0675)=(875) 05 55/ 15/ 0425+0825/ 125 Wednesday: 87,5% healthy 12,5% ill  $(95)^2 = 0.9025$ The probability of being healthy two days in a row is 90,25% (given the we start of healthy) Let  $M = \begin{pmatrix} 7 & 1 & 1 \\ 2 & 8 & 2 \\ 1 & 1 & 7 \end{pmatrix}$ Have to solve MI= = (M-I) = 0 So we have 1 1

