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Assig	nment	-2
= 0		7.

1. Gran-Schnidt Process

V, V2 V3

Let the orthonormal basis be (9,92,93) in 1R3

(a) Frest check if QR decomposition is possible.

\* Check i) Bt, Bt & B3t is independent.

$$e_{1}\beta_{1}+c_{2}\beta_{2}+c_{3}\beta_{3}=0$$
 =  $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 3 & c_{2} & = 0 \end{bmatrix}$   
Row exhalon form for A  $\begin{bmatrix} 1 & -1 & 4 & c_{3} & 0 \end{bmatrix}$ 

=> c3=0, C2=0, G=0. -- As (=0= c2= G=0 · A cis a basis containing (pit, pt RBt) ... OR decomposition ies possible. 6 Let Q be (9/192193) in 183 Using Grain-Schnidt process, Let V1 = Bit, V2 = Bit, V3 = Bit  $\frac{1}{2} = \frac{1}{2} = \frac{1}$ V 12+02+12 Now 9 = V2 - (9, tv2) 91

$$\Rightarrow 2' = \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} - \begin{pmatrix} 1 \\ 1 \\ 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \begin{bmatrix}$$

$$\frac{93' = 0}{3} - \frac{1}{52} = 0$$

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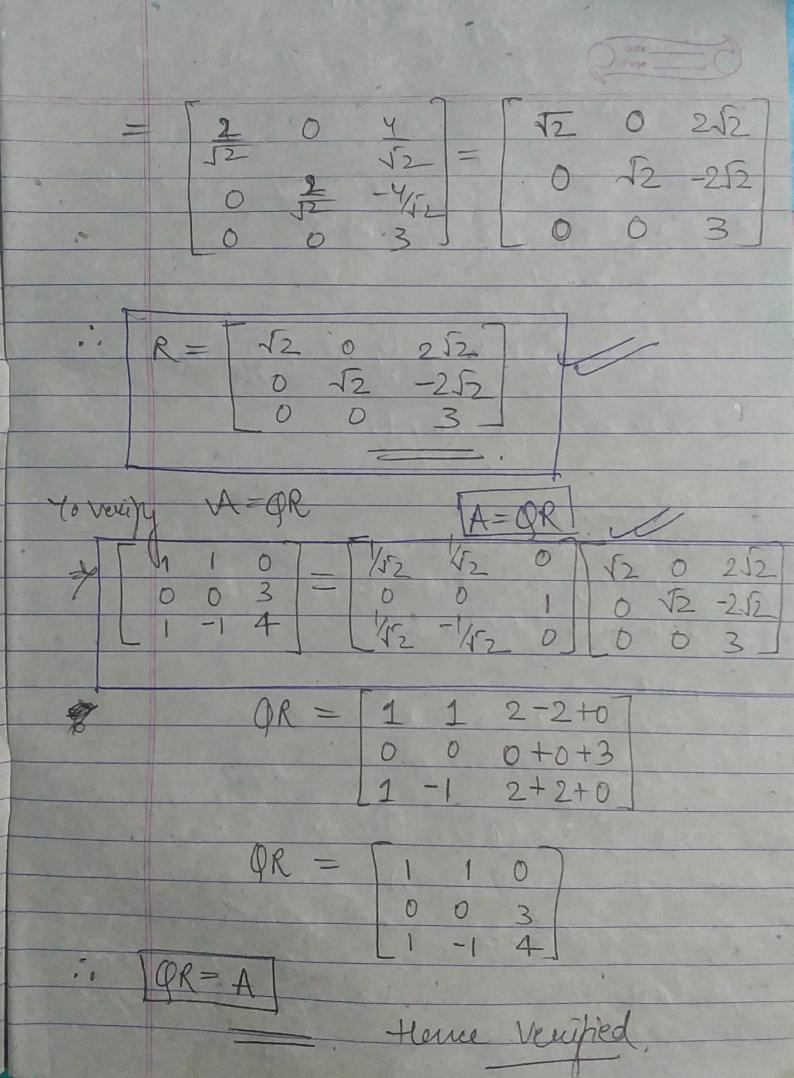
$$\frac{1}{4} = 0$$

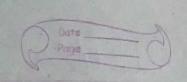
$$\frac{1}{52} = 0$$

$$\frac{1}{52}$$

Page \_\_\_\_ 9+93 = [1/201/2][0] = [0+0+0] = 0 9291 = [450 - 45][45] = [1+0+(1)] [4] = [450 - 45][45] = [40+(1)] [4] = [450 - 45][45] = 09±93 = [1/20'-1/2][0] = [0+0+0] = 0 93 9, = [0 10][1/2] = [0+0+0] = 0 93 92 = [0 10][1/15] = [0+0+0] = 0 -1/12  $i \cdot g + g = \begin{cases} 1 & \text{for } i = = j \\ 0 & \text{for } 1 \le i \neq j \end{cases}$   $i \cdot g + g = \begin{cases} 1 & \text{for } i = = j \\ 0 & \text{for } 1 \le i \neq j \end{cases}$ - 29,92,923 are orthonormal vectors.

- p is orthogonal matrix with orthonormal vectors. Now or calculating R in (QR=A) 2tv1 9tv2 9t v3 Upper tranquear
0 92 v2 92 t v3 Natrix. = 101 1 [101 1 101 0 \(\frac{1}{2}\)\(\frac{1}{2}\ T10-1 1 10-1 0 T2 T2 0 T2 T2 3 12. TZ - TZ 15 to +7 0 to - 1 0 0+3+0





2. (a) Let E be projection of (x, x2) on subspacely.

Len E can be written as,

E=ka unure a is a vector in wo a= (3,4)

 $\frac{1}{100} = \frac{3}{100} = \frac{3}$ 

 $\frac{1}{25} \cdot k = 3x_1 + 4x_2$   $\frac{25}{25} \cdot E = ka = (3x_1 + 4x_2) \left[ \frac{3}{4} \right]$ 

 $6. E(x_1,x_2) = (9x_1 + 12x_2, 12x_1 + 16x_2)$ 

(b) Projection matrix =  $\frac{aat}{ata} = \begin{bmatrix} 3\\ 4 \end{bmatrix} \begin{bmatrix} 3 \\ 4 \end{bmatrix}$ 

 $= \frac{9}{12} \frac{12}{16} = \frac{1}{9} \frac{9}{12} \frac{12}{16}$ 

(c) Let 
$$V = W^{\perp}$$
 where Viu a subspace of R<sup>2</sup> spanned by vector (xy)

$$wtv = 0 \Rightarrow [34][x] = 0 \Rightarrow 3x + 4y = 0$$
Let  $(x_4y) = (-4,3)$ 

$$| W^{\perp} = L_{\gamma}^{2} (-4,3)^{\frac{2}{3}} |$$

$$| W^{\perp} = | L_{\gamma}^{2} (-4,3)^{\frac{2}{3}} |$$

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(d) For  $E = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ , we need orthogonal basis up

such that  $E(u) = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ , and  $E(v) = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$   $E(u) = 1 \cdot u + 0 \cdot v = u$ Orthonormal basis:  $u = \begin{bmatrix} 3/5 \\ 1/5 \end{bmatrix}$ ,  $v = \pm \begin{bmatrix} -4/5 \\ 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$   $= \begin{bmatrix} 3/5 & -4/5 \\ 1/5 & 3/5 \end{bmatrix}$