CS5820: GIPU HW: Assignment 2

- Abburi Venkata Sai Mahesh - CS18 BTECH 11 OD 1

Given the point on the cylinder = (x, y, t) Let the unit vector V1= (V11, V129 V13) V2 = (1/21 7 1/22 7 1/23)

1. Rotate point on cylindes around Vi=

To do this we consider the following steps

1.1 Franslate given point to origin

1.2 Align V, with z-axis

1-3 Rotate about aligned Z-axis

1.4 Realign VI

1.5 Translate back to given point

So You consider

(.) Translate given point to origin Transformation matrix

$$T_{P,0} = \begin{bmatrix} 1 & 0 & 0 & -x \\ 0 & 1 & 0 & -y \\ 0 & 0 & 1 & -z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

1.2) Align Vi with Z-anis To do this we follow the following stops 121) project v, onto x-2-plane 1.22) Project along 7-axis 1.2.1) Project V, onto X2 - plane By using directional coones we get Transformation matrix VIZ 17:22 0 1.2.2) project along z-axis Transformation motive 1 TV12+V12+V13

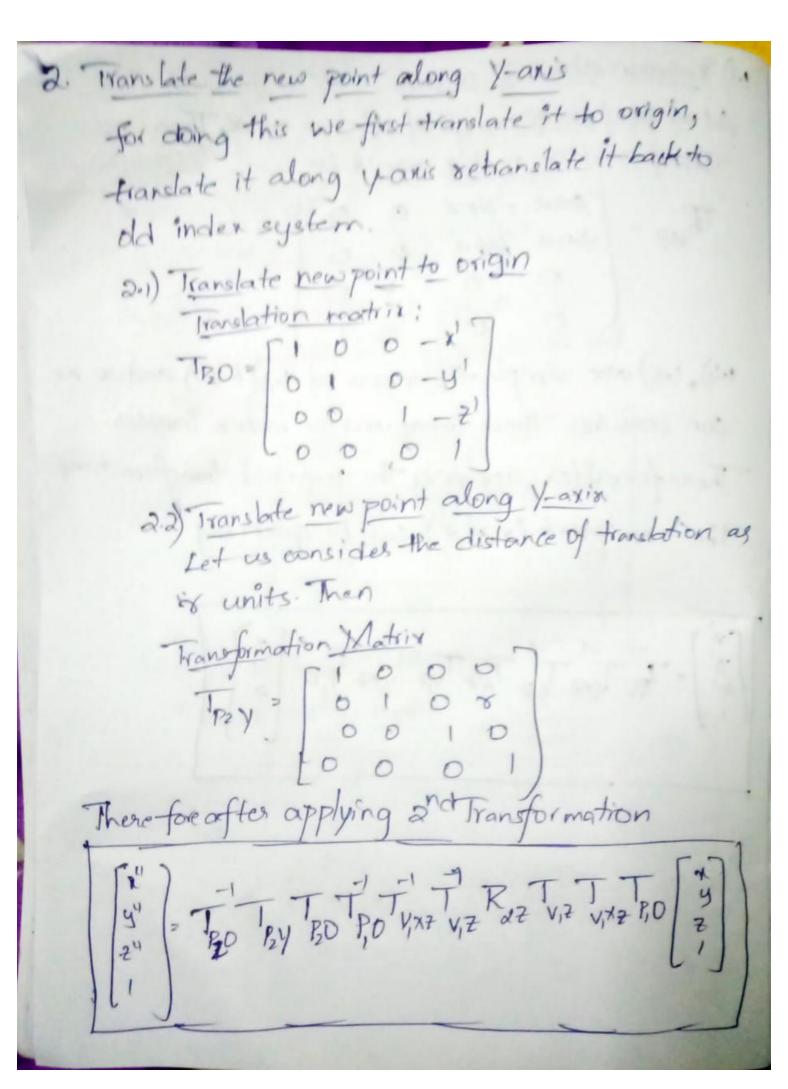
Let us consider the angle of rotation as X, Then
Transformation matrix would be

RX7 = [cost - sink 0 0]

sind cost 0 0

1.4), 1.5) are simple the inverse of 1.2) & (1) and so we con consider these transformation matrix inverses.

Thereforeafter applying the required transformations the new point (x', y', z') can be given by



This is similar to that of First point with the few considerations that using  $V_1 = [V_1, V_2, V_3]$  instead of  $V_1 = [V_1, V_1, V_1, V_1, V_2]$  instead of  $V_2 = [V_1, V_1, V_2, V_3]$  instead of  $V_3 = [V_1, V_1, V_2, V_3]$  and an angle of votation  $P_3$  instead of  $P_4 = (V_1, V_2, V_3)$  and an angle of votation  $P_4$  instead of  $P_4$ .

So the final Matrix will be otained by

:. The final transformation Matrin is

T=T30 V2x2 V2 RBZ V2Z V2X2 B30 T20 EY P20 P20 VXZ 22 V1X2 P20