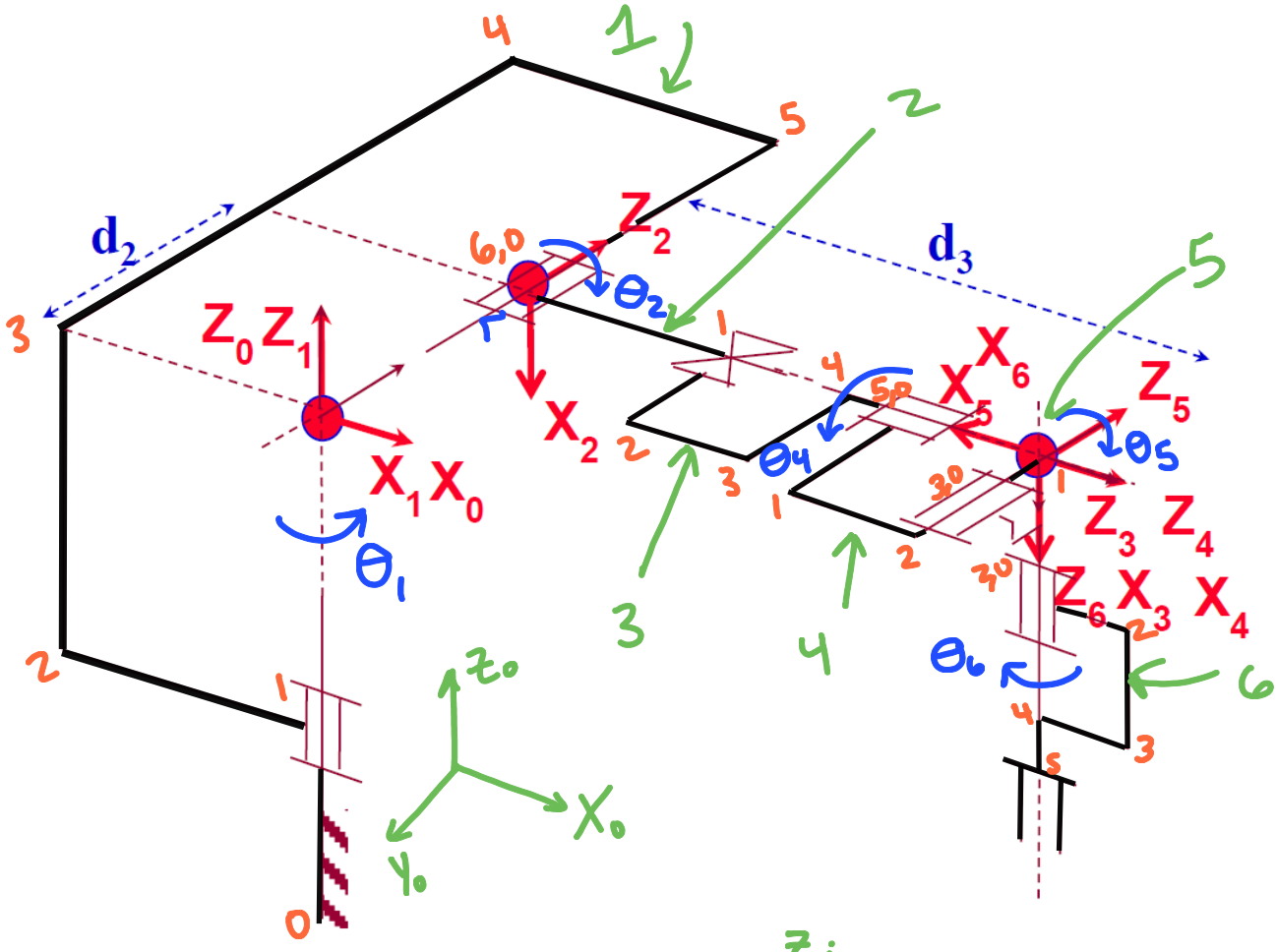
R^2PR^3 Manipulator



	x_{i-1}		z_i	
i	a_{i-1}	α_{i-1}	d_i	θ_i
1	0	0°	0	θ_1^*
2	0	−90°	d_2	$90° + \theta_2^*$
3	0	+90°	d_3	0°
4	0	0°	0	θ_4^*
5	0	−90°	0	$90° + \theta_5^*$
6	0	+90°	0	θ_6^*

try:

Show $\dot{\theta}$ & $\dot{X}$ vectors on simulation

- error control for handeling input

  1 function - input w/ allowed range for $\dot{\theta}$ & auto print statement

Joint Limitation

θ_1	[-180 180]
θ_2	[-90 90]
d_3	[1 3]
θ_4	[-180 180]
θ_5	[-25 25]
θ_6	[-180 180]

Assignment details:

- You need to calculate the DH parameter and show it in the form of a table. (15 points)
- Calculate homogenous transformation matrices (your code should include ${}_{i}^{i-1}T$.) You can use the symbolic toolbox in MATLAB as well. (20 points)
- Calculate and illustrate the numerical values of the End-effector position and rotation for desired joint variables. (15 points)
- Simulation result for desired joint variables. Please include the video of the simulation in your submission. (20 points)
- Find and illustrate the velocity kinematics of the end effector (you need to construct the Jacobian Matrix). (25 points)
- Find singularity configuration, if any. (5 points)

Please submit the RTF OR m.file, AND pdf published file, AND simulation video. You need to show the output of each step. **Please do not compress your files with RAR or ZIP or other extensions.**

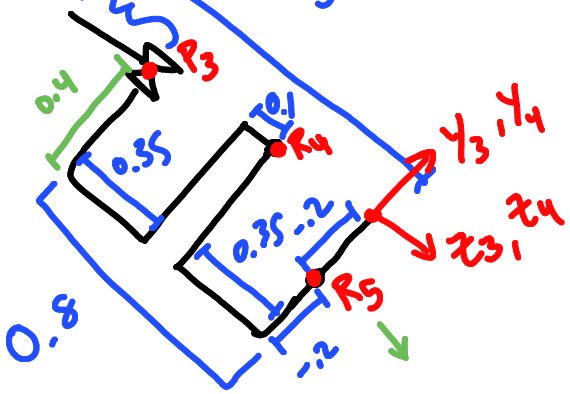
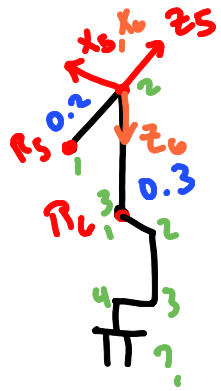
Please prepare a proper report. The screenshot of the command line is not an acceptable OUTPUT.

Considering that each step of the assignment will receive separate points, you are encouraged to complete the project as far as you can.

$$\begin{bmatrix} T_{i-1,i} \\ 0 \;\; 0 \;\; 0 \;\; 1 \end{bmatrix}_{4\times 4} \begin{bmatrix} {}^{i}x_1 & {}^{i}x_2 & \cdots & {}^{i}x_m \\ {}^{i}y_1 & {}^{i}y_2 & \cdots & {}^{i}y_m \\ {}^{i}z_1 & {}^{i}z_2 & \cdots & {}^{i}z_m \\ 1 & 1 & \cdots & 1 \end{bmatrix}_{4\times m} = \begin{bmatrix} {}^{0}x_1 & {}^{0}x_2 & \cdots & {}^{0}x_m \\ {}^{0}y_1 & {}^{0}y_2 & \cdots & {}^{0}y_m \\ {}^{0}z_1 & {}^{0}z_2 & \cdots & {}^{0}z_m \\ 1 & 1 & \cdots & 1 \end{bmatrix}_{4\times m}$$

$${}^{0}_{1}T\,{}^{1}P_m = {}^{0}P_m$$

changes $[-0.2, -2.2]$

$d_3 = [1, 3]$

$0, -2$