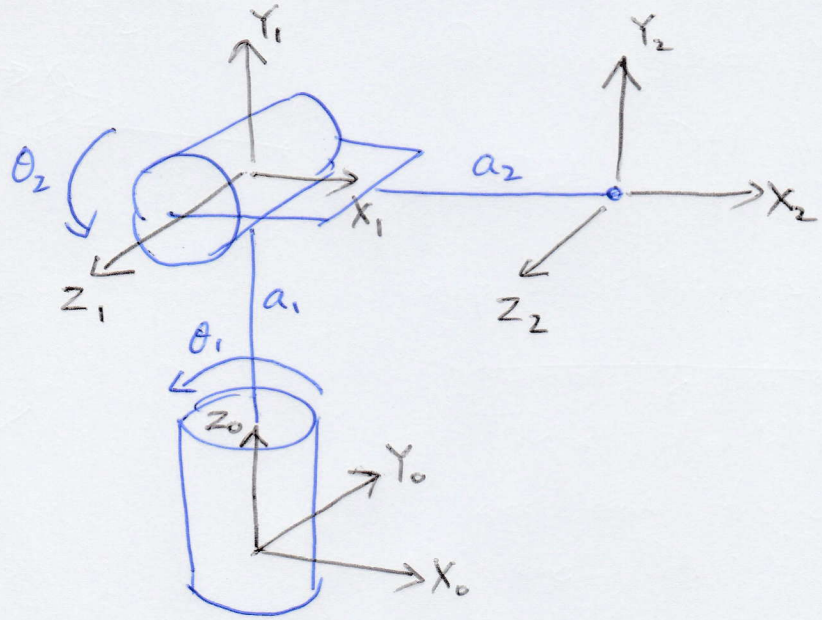
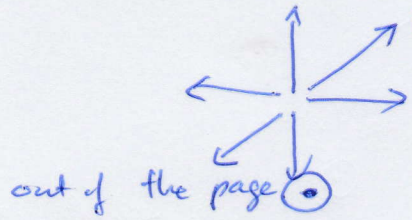
Example – Analysis of a simple manipulator w 2 revolute joints



① Kinematic modeling using DH representation

Note :

- There should be at least one more frames than number of joints
- One frame must be on the end effector
- All axes should be drawn in one of the following directions :



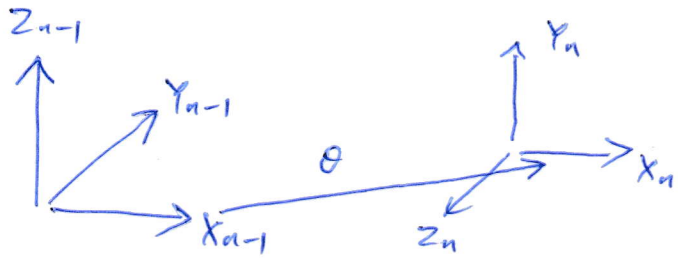
Four D-H Frame Rules :

1. z-axis == axis of revolution or direction of motion
2. x-axis must be peripendicular to z-axis of previous frame.
3. x-axis must intersect z-axis of previous frame.
4. y-axis must be drawn such that the frame follows right-hand rule.

DH Parameter Table

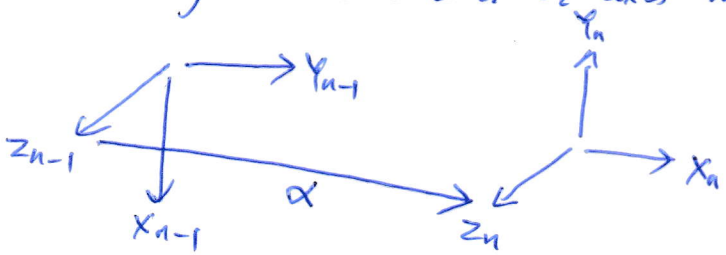
Link	Rotations		Displacement	
	θ	α	a	d
1	$0 + \theta_1 = \theta_1$	$+90°$	0	a_1
2	θ_2	0	a_2	0

θ : angle between X_{i-1} axis and common normal $H_i O_i$ measured along Z_{i-1} axis in right-hand sense.



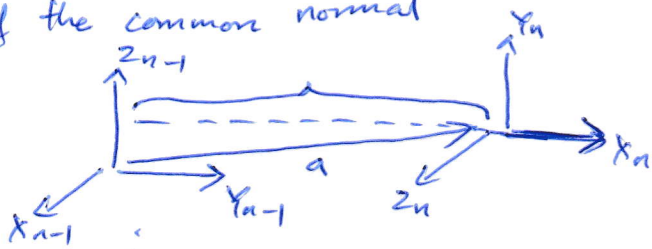
Rotate around Z_{n-1} by θ such that X_{n-1} matches X_n, including the revolute joint variable.

α: angle between joint axis i and Z_i axis in right-hand sense.



Rotate along X_n by α such that Z_{n-1} matches Z_n

a : length of the common normal



d : distance between the origin O_{i-1} and point H_i