Task 1

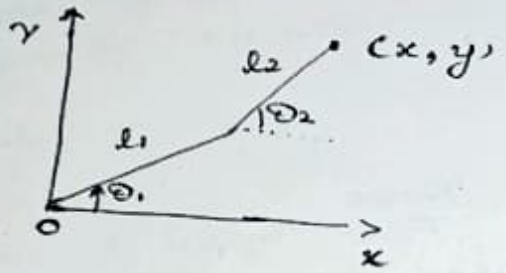
a) 1) Forward Kinematics

Process of finding End effectors using → Joint Parameters

2) Inverse Kinematics

Process of finding Joint Parameters using → End Effectors

Ex:



→ Forward Kinematics

$\{\theta_1, \theta_2, l_1, l_2\} \longrightarrow (x, y)$

→ Inverse Kinematics

$(x, y) \longrightarrow \{\theta_1, \theta_2, l_1, l_2\}$

b) Inverse Kinematics is used mostly in robotics because

- Inverse Kinematics is generally used when end effector is controlled by other joints
- In practical life this would be done by a servo Motor.
- Applications include Robot Manipulation and path planning
- The Primary Reason we use Inverse Kinematics is because in real life we have control only with the servo motor and not end effectors directly so we use IK to find the given end-effector position by manipulation motor variables

Transformation

Homogeneous Transformation Matrix

$$T = \begin{pmatrix} R & P \\ 0 & 1 \end{pmatrix}$$

- Combination of Rotational Matrix and position Vector of the body frame into a single Matrix
- Using such Matrices reduces the calculation
- It acts on a frame or Vector and change its representation from one co-ordinate to another co-ordinate frame.