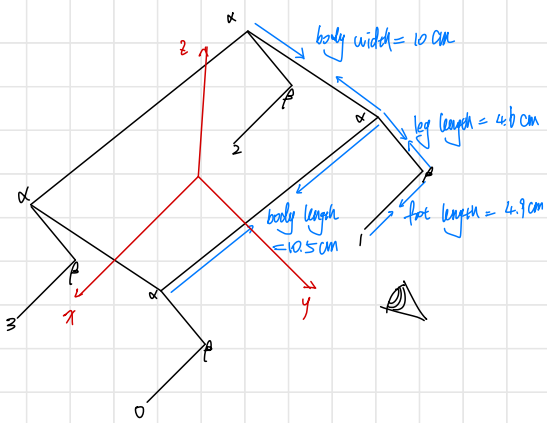
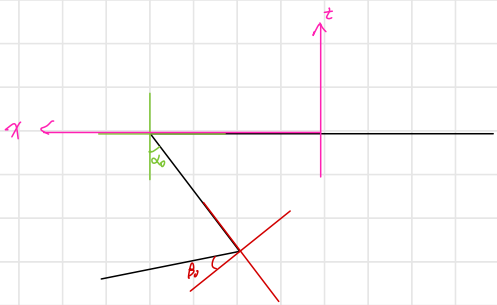
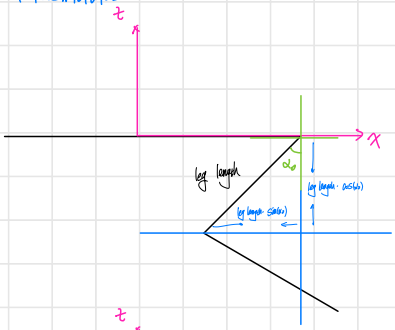
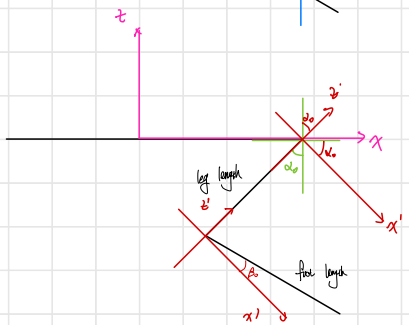




- Forward kinematics



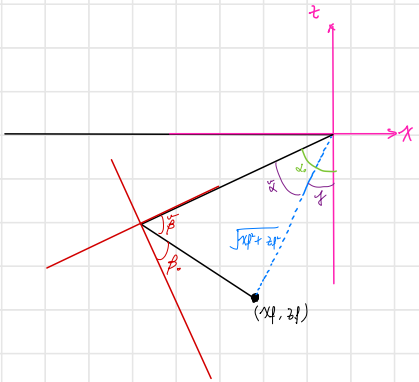
knee



α_0 clockwise

$xz \longrightarrow x'z'$

- Inverse kinematics for one leg.



(x_f, z_f) is the coord of end-effector w.r.t shoulder

$$x_f^2 + z_f^2 = (\text{leg length})^2 + (\text{foot length})^2 - 2(\text{leg length})(\text{foot length})\cdot\cos\tilde{\beta}$$

$$\tilde{\beta} = \arccos\left(\frac{(\text{leg length})^2 + (\text{foot length})^2 - (x_f^2 + z_f^2)}{2(\text{leg length})(\text{foot length})}\right)$$

$$\beta_0 = \frac{\pi}{2} - \tilde{\beta}$$

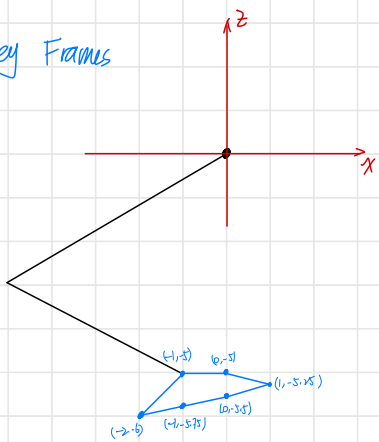
$$\gamma = \arcsin\left(\frac{-x_f}{\sqrt{x_f^2 + z_f^2}}\right)$$

$$(\text{foot length})^2 = (\text{leg length})^2 + (x_f^2 + z_f^2) - 2(\text{leg length})\cdot\sqrt{x_f^2+z_f^2}\cos\tilde{\alpha}$$

$$\tilde{\alpha} = \arccos\left(\frac{(\text{leg length})^2 + (x_f^2+z_f^2) - (\text{foot length})^2}{2(\text{leg length})\sqrt{x_f^2+z_f^2}}\right)$$

$$\alpha_0 = \tilde{\alpha} + \gamma$$

- key Frames



Servo index on MyBoard V1.1

Servo index for α

Servo index for β