Due: 11:59pm, November 06, 2024

1. A planar RPR robot is shown below. Its joint variables are A, B and C. Length D is a constant. Its end-effector position and orientation are given by P_x, P_y and ϕ. Derive the inverse kinematics equations for this robot.

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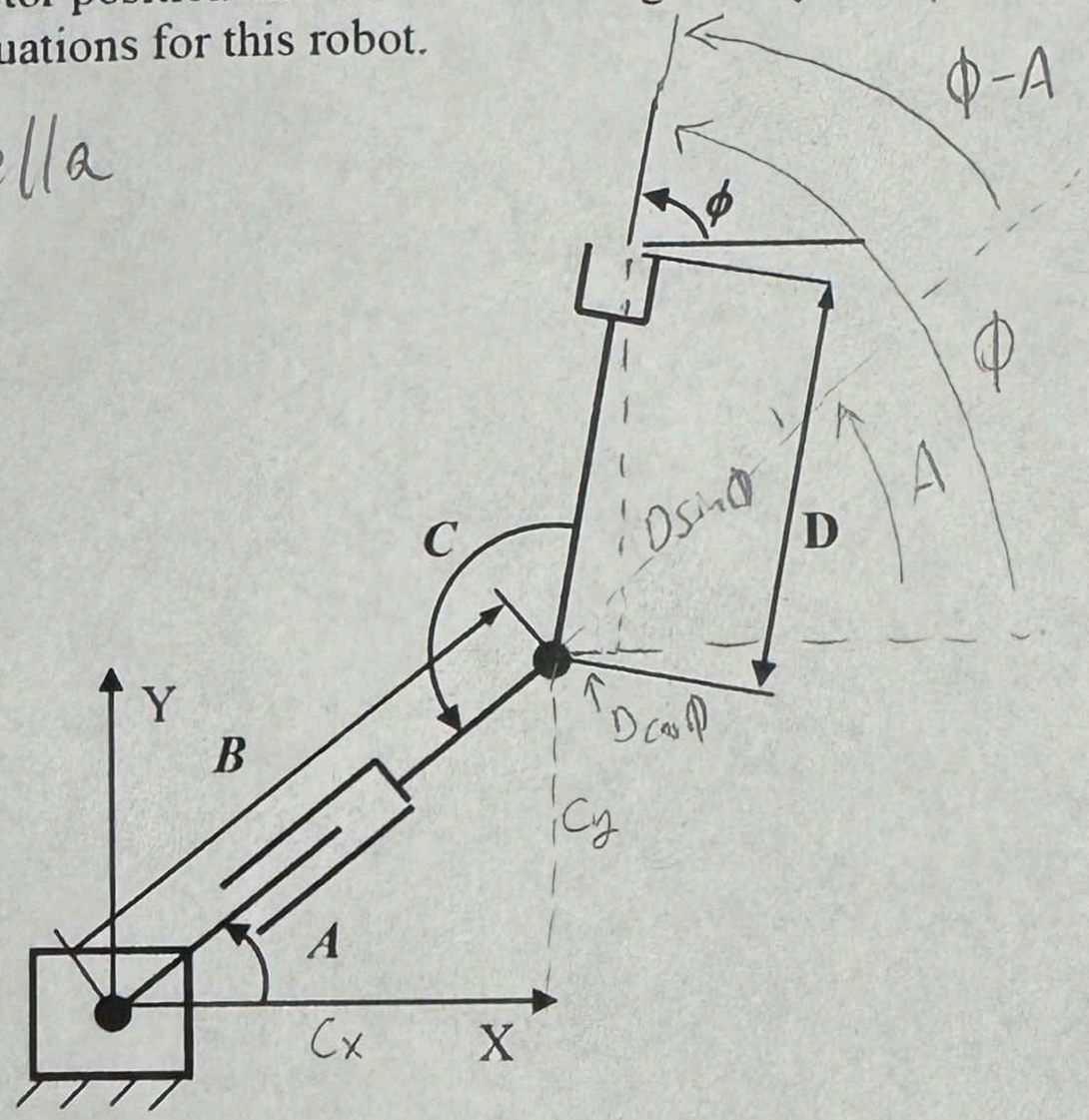

$C_x = P_x - D\cos\phi$

$C_y = P_y - D\sin\phi$

$B = \pm\sqrt{C_x^2 + C_y^2}$

$A = \text{atan2}\left(\frac{C_y}{B}, \frac{C_x}{B}\right)$

$C = \pi - \phi + A$

$C = \pi - \phi + \text{atan2}\left(\frac{C_y}{B}, \frac{C_x}{B}\right)$

$C = \pi - \phi + \text{atan2}\left(\frac{C_y}{+\sqrt{C_x^2+C_y^2}}, \frac{C_x}{+\sqrt{C_x^2+C_y^2}}\right)$

$C = \pi - \phi + \text{atan2}\left(\frac{C_y}{-\sqrt{C_x^2+C_y^2}}, \frac{C_x}{-\sqrt{C_x^2+C_y^2}}\right)$

2 solutions