Inverse Kinematic Equations

The IK equations for our P3R manipulator bases on a simple 3R planar arm with the addition of the prismatic join, this one represents the Z axis.

$$\beta = \text{Atan2}(y, x).$$

$$\cos\psi = \frac{x^2 + y^2 + l_1^2 - l_2^2}{2l_1\sqrt{x^2 + y^2}}.$$

$$\theta_1 = \beta \pm \psi,$$

$$\theta_1 + \theta_2 + \theta_3 = \phi.$$

$$c_2 = \frac{x^2 + y^2 - l_1^2 - l_2^2}{2l_1 l_2}.$$

$$d = Z$$