1. Write down the inverse of the matrix

\[ A = \begin{pmatrix}
\cos \theta & -\sin \theta & \cos \alpha & \sin \theta & \sin \alpha & a & \cos \theta \\
\sin \theta & \cos \theta & \cos \alpha & -\cos \theta & \sin \alpha & a & \sin \theta \\
0 & \sin \alpha & \cos \alpha & 0 & 0 & 0 & 1 \\
0 & 0 & \cos \alpha & d & 0 & 0 & 0
\end{pmatrix}. \]

2. Given a prescribed position and orientation of the planar 3-bar manipulator of the second Exercise Set, there are two possible solutions to the inverse kinematics problem. If we add one more link (in such a way that the manipulator is still planar), how many solutions are there?

3. The figure shows a 2-bar planar manipulator with rotary joints. The second link is half as long as the first \((r_1 = 2r_2)\). The joint limits are:

\[ 0 < \theta_1 < 180^\circ \]
\[ -90^\circ < \theta_2 < 180^\circ. \]

Sketch the approximate workspace (= the set of points which can be reached by the tip of the second link).