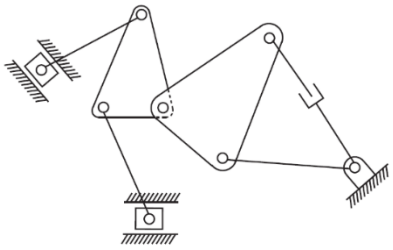
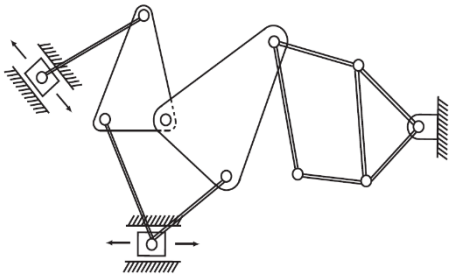
Assignment #1: Robot's DoF and Workspace

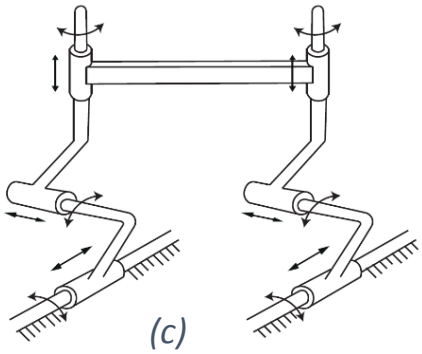
Problem 1: For the following mechanisms, find the number of degrees of freedom:



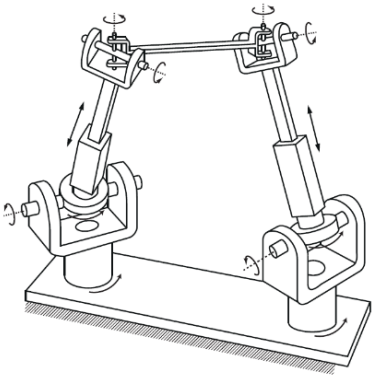
(a)



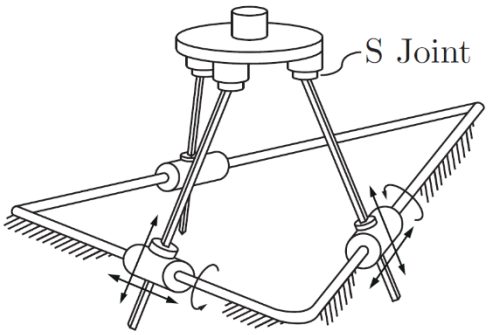
(b)



(c)

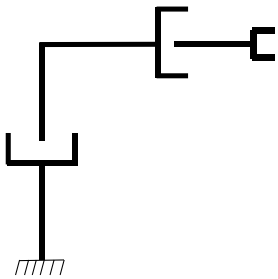


(d)



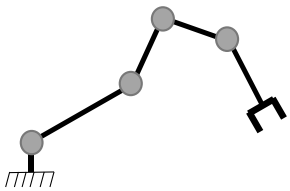
(e)

Problem 2: Draw the workspace of each of the following robots:

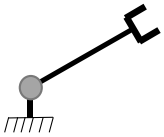


(a)

(b)



(c)



(d)

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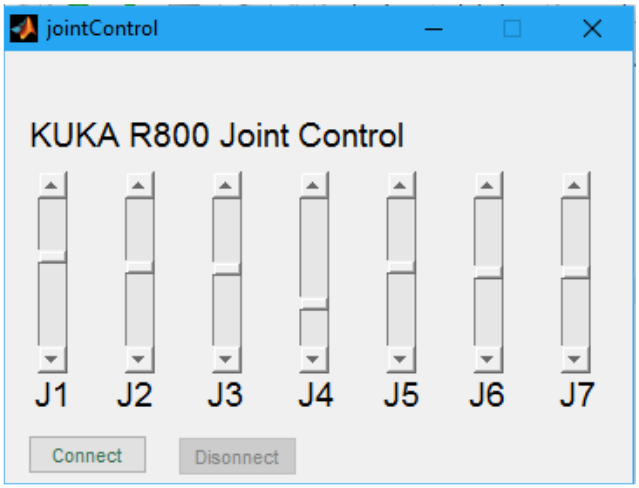
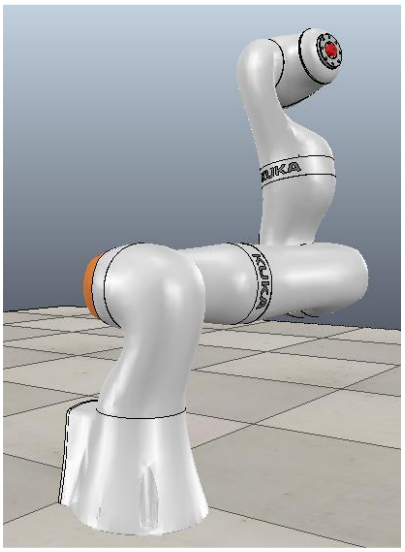
Problem 3: In V-REP simulator, choose a certain robot manipulator and build a GUI on MATLAB, or other programming language, to move each joint independently. The GUI should have a 'Connect' and 'Disconnect' buttons to start and end the communication with V-REP. At the initialization of the GUI, the sliders values should be synchronized to the current manipulator joints values.





Problem 4: The tip coordinates for the shown two-link planar 2R robot are given by:

$$x = 2\cos\theta_1 + \cos(\theta_1 + \theta_2)$$

$$y = 2\sin\theta_1 + \sin(\theta_1 + \theta_2)$$

Write a MATLAB code to draw the robot reachable workspace.