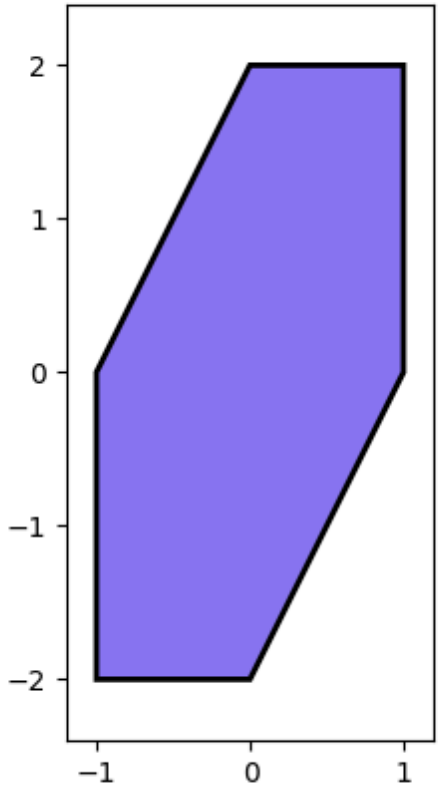
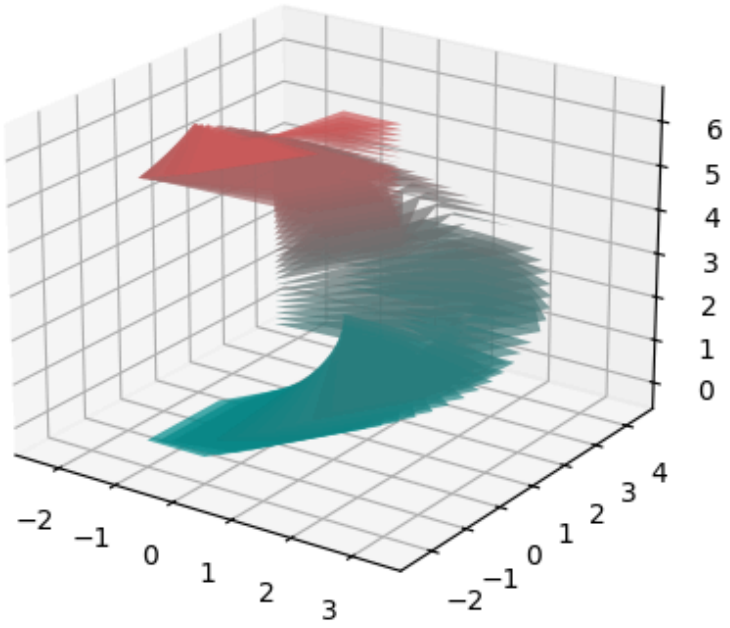
Homework 4

Problem 1:

a) Vertices: {(-1, -2), (0, -2), (1, 0), (1, 2), (0, 2), (-1, 0)}



b)

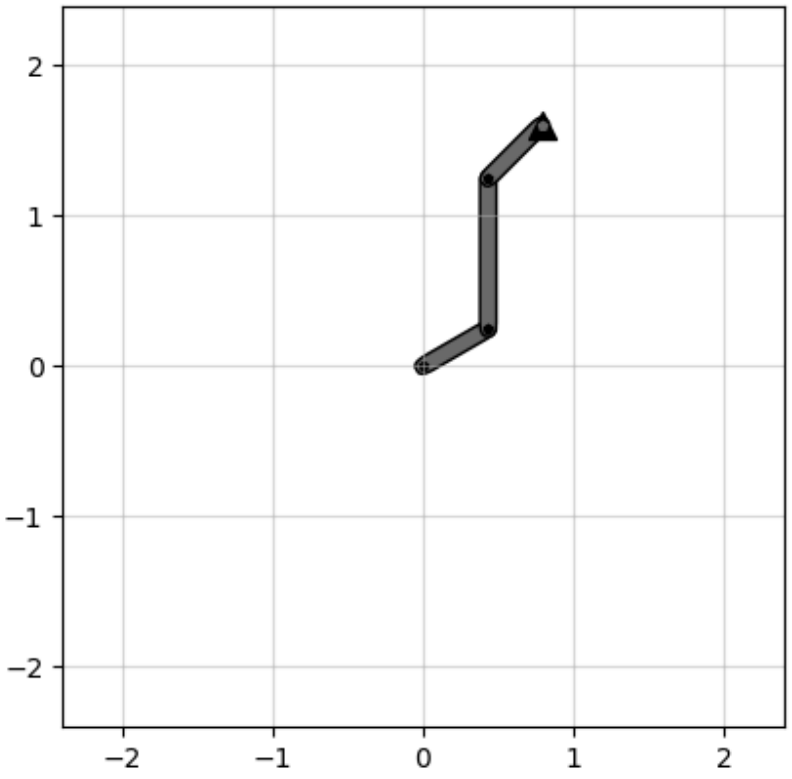


Problem 2:
These problems did not pass the auto grader. I spoke with Yusif, and he indicated that this may be an issue with the autograder. Either way, I have checked the forward kinematics against my own hand calculations, and confirmed with Yusif. I then plugged my inverse kinematics angle results into my forward kinematics, and got an end position of (2, 0), which was desired. My program does allow for the user to change link lengths and angles, and plot the result of this. This can be done by filling out a1,2,3 and theta1,2,3 in Forward kinematics, or by specifying an endpoint in xe and ye in forward kinematics. In order to plot this, you must pass the values and links calculated in inverse kinematics into the forward kinematics function, which will then plot the manipulator. You must also change the link values in, on lines 6-8

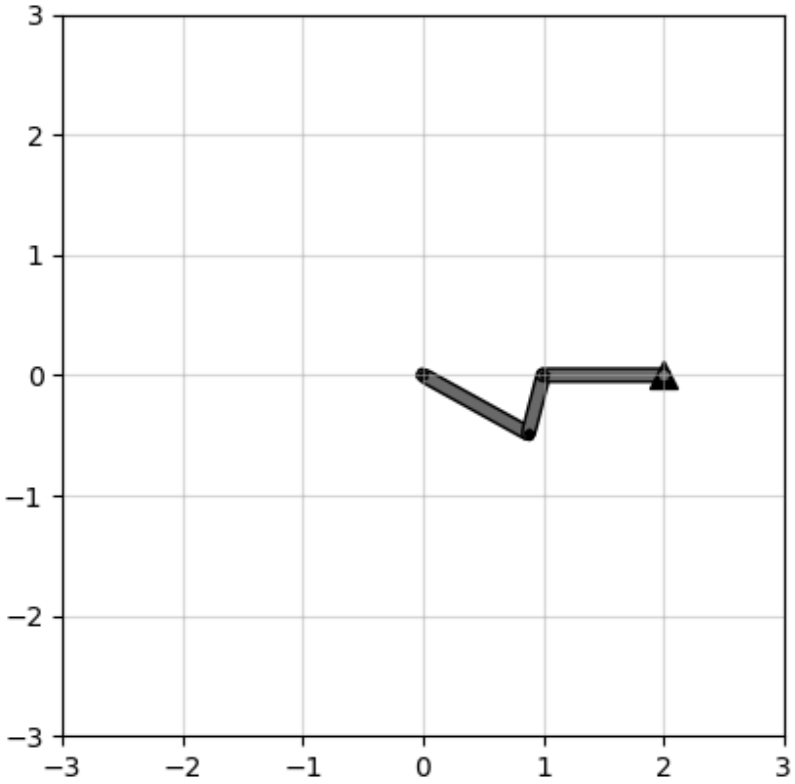
```
MyManipulator2D::MyManipulator2D()
   : LinkManipulator2D({0.5,1.0,0.5}) // Default to a 2-link with all
links of 1.0 length
{}
```

Assumptions:
I made the angle of the third link such that it was pointing towards the origin in order to add a constraint. Using this constraint I was able to use the law of cosines to find the other 2 angles.

a) Joints at: (0, 0), (0.433013, 0.25), (0.433013, 1.25), (0.786566, 1.60355)

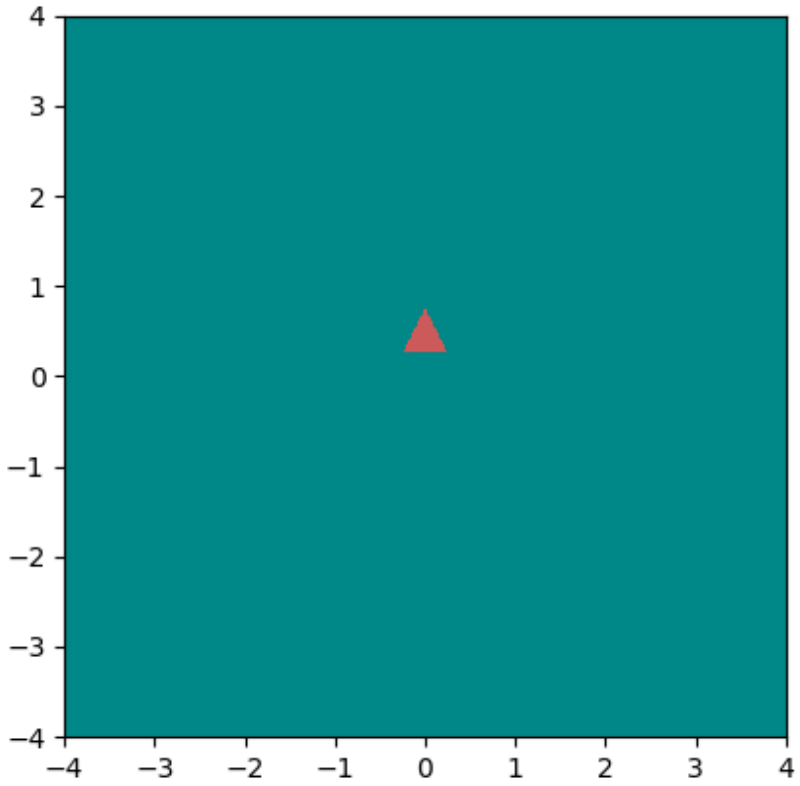


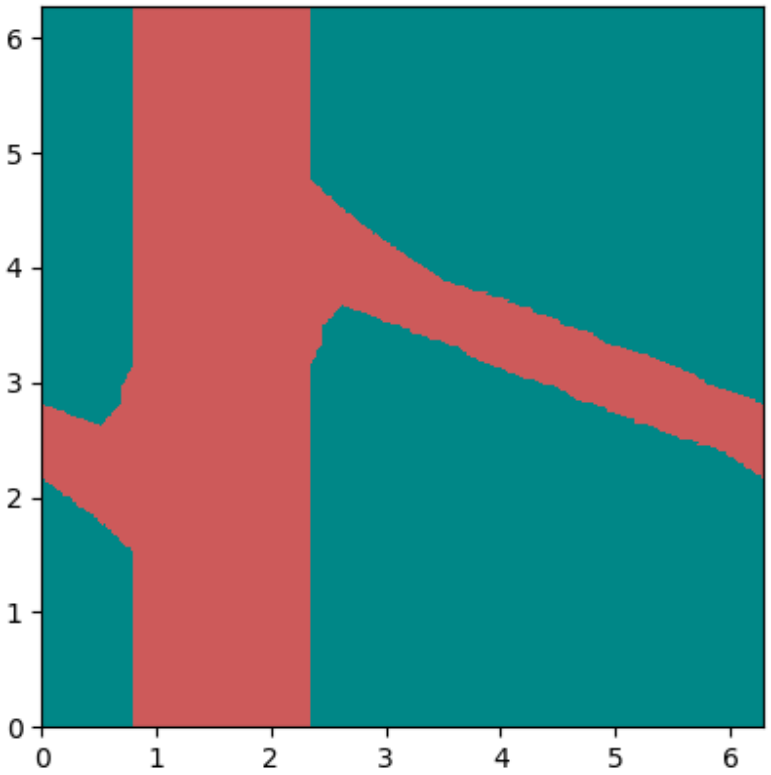
b) Angles: Joint 1: -0.505361 Joint 2: 1.82348 Joint 3: -1.31812



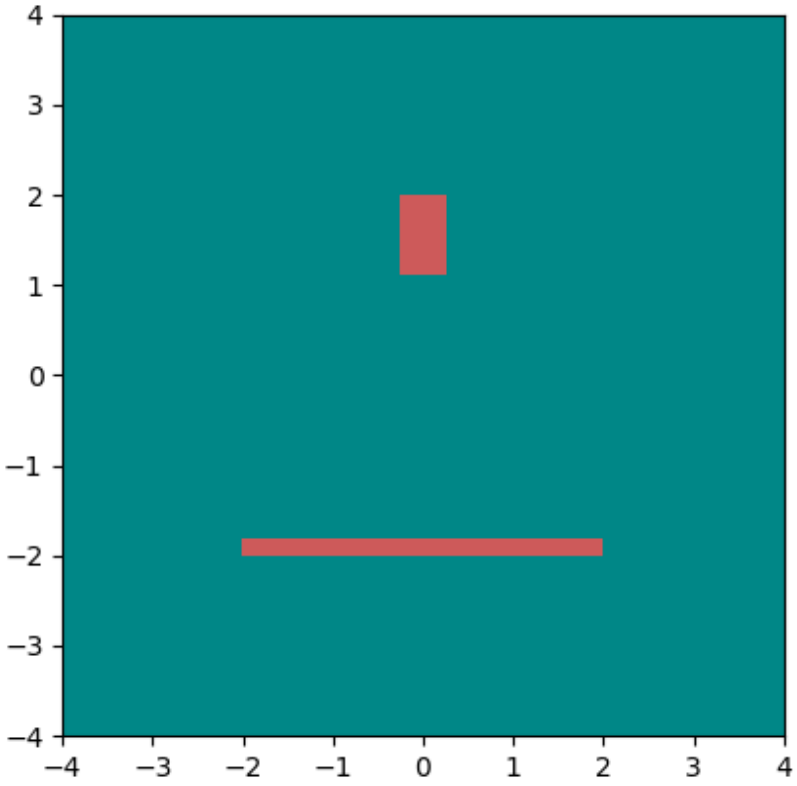
Problem 3:

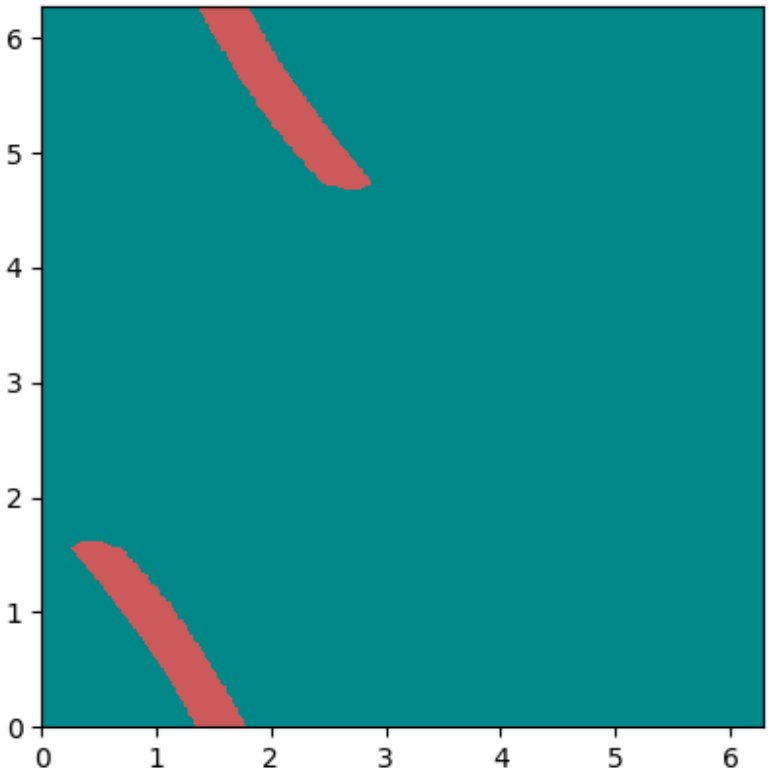
a)



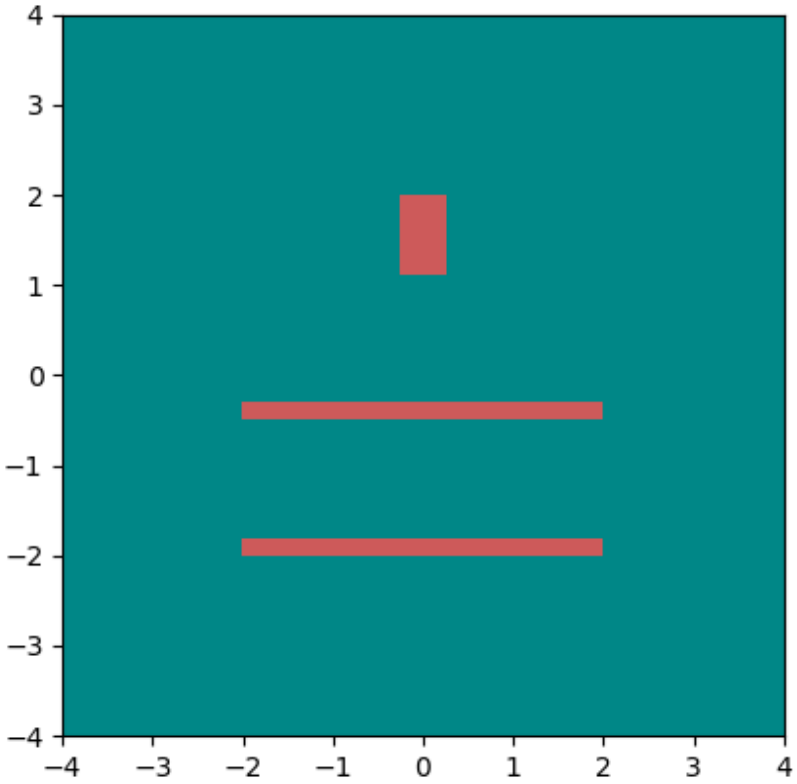


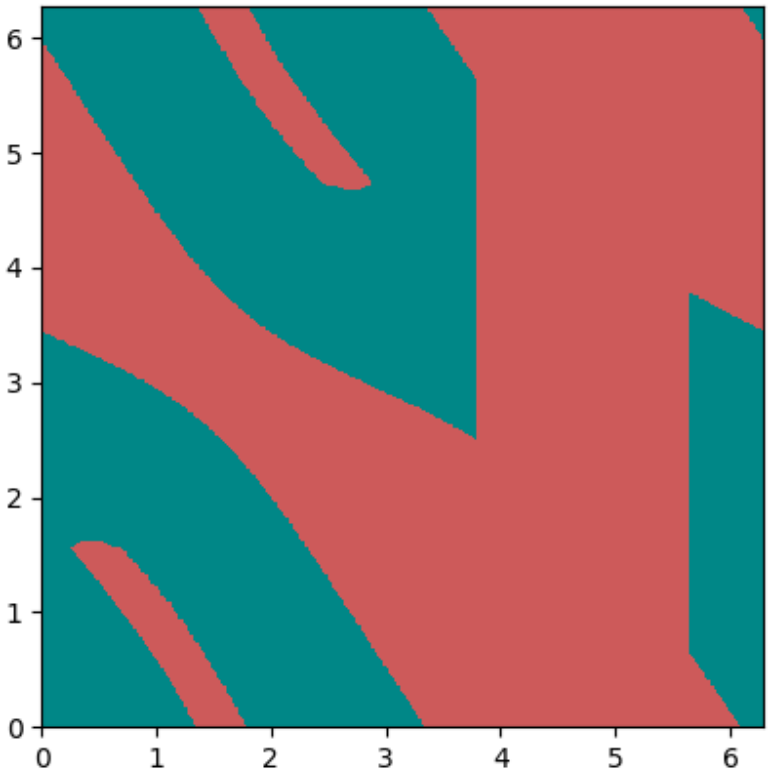
b)


4
3
2
1
0
−1
−2
−3
−4
−4
−3
−2
−1
0
1
2
3
4


0
1
2
3
4
5
6
0
1
2
3
4
5
6

c)




0
1
2
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6