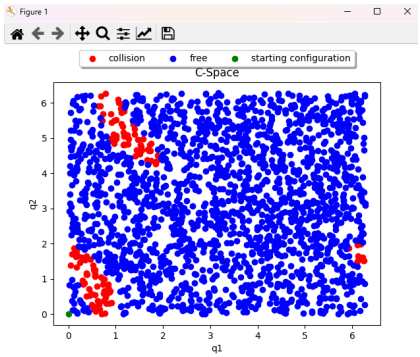
# negative rotation issue

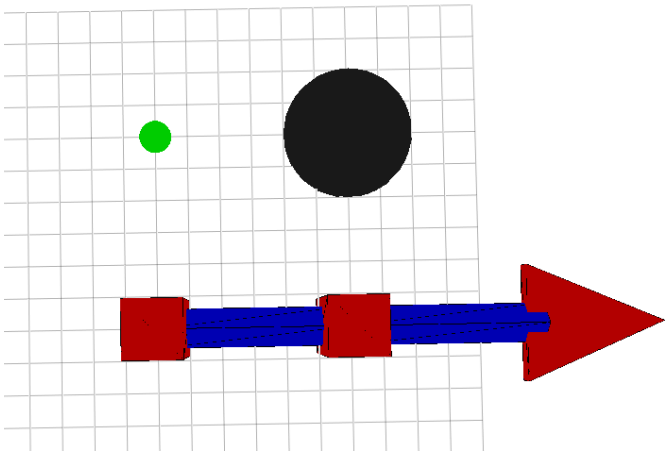
if we only generate positive q values, the problem will appear unsolvable based on the c-space when really you just need to do a backwards rotation

▼ for example in this c-space:

- based on the c space there appears to be no solution. you simply can't get out of that corner in the bottom left
- looking at the robot configuration on the right this makes sense. there is no combination of joint angles that could get you to the green target if you're limited to only moving  CCW because joint 1 is just too long

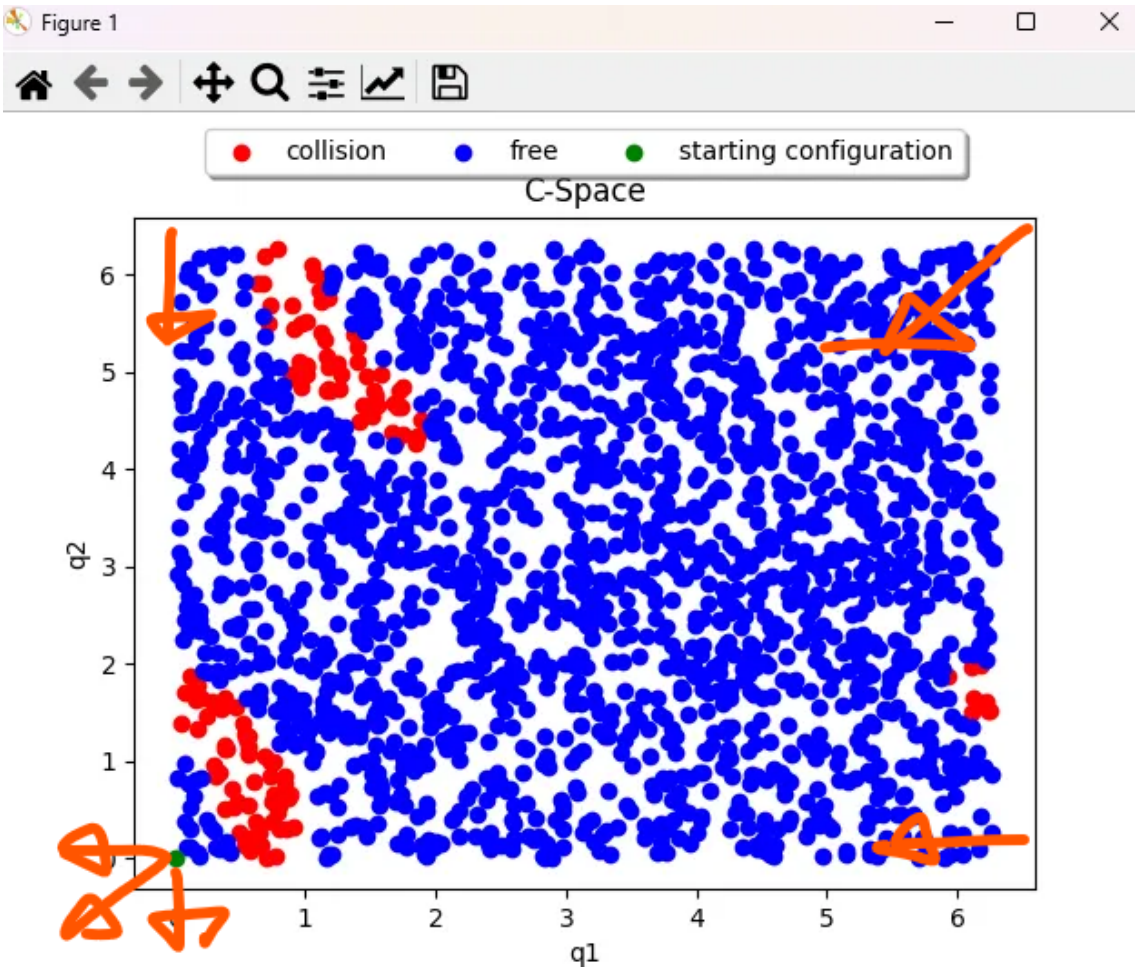
  ▼ if we make the obstacle a bit further away we'll see a path open up:



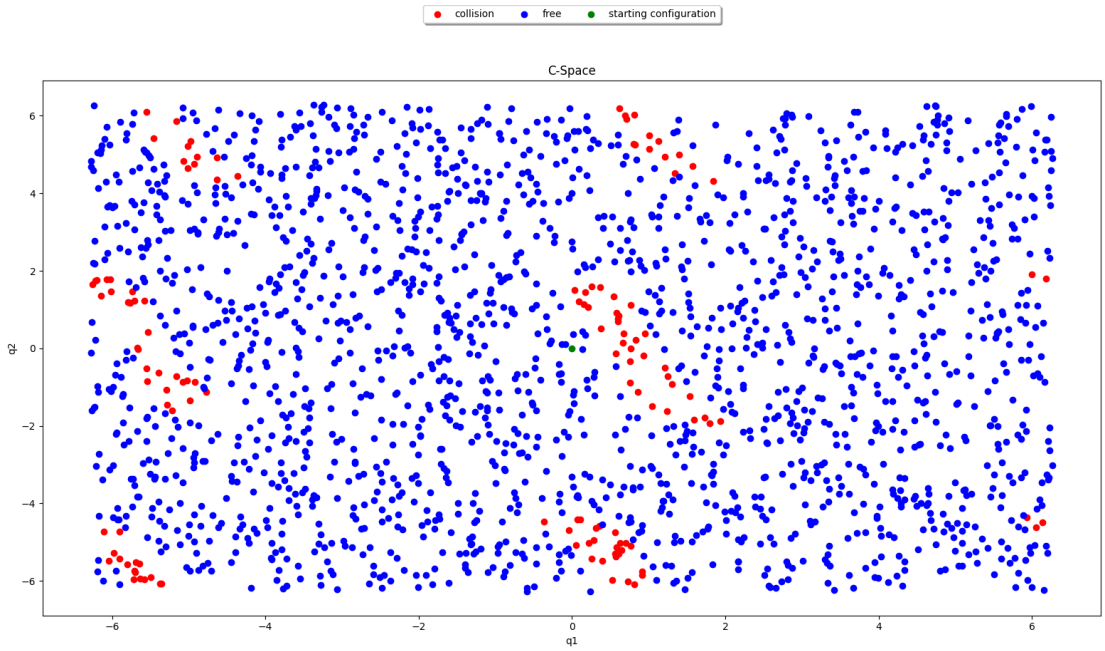
- however we know that if you just rotated clockwise you would be able to reach the obstacle

▼ rotating clockwise is equivalent to a negative joint angle, which is really just the same as jumping from 0 to 2pi like this

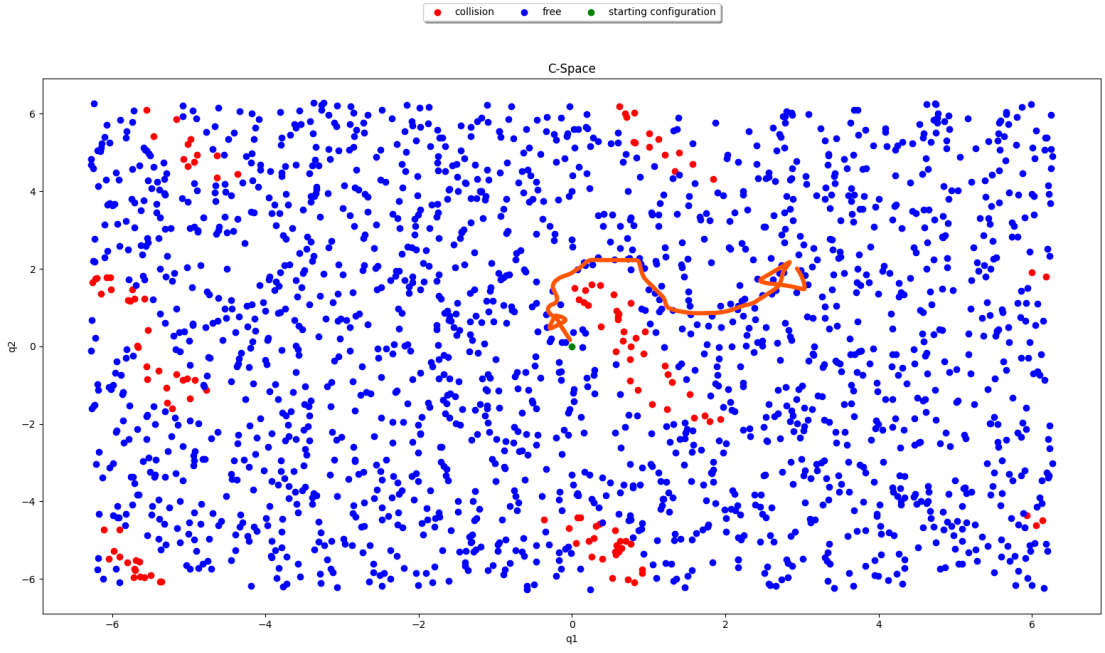



- however just jumping from 0-2pi is no really feasible to implement using graph shortest path finding algorithms

▼ so instead I will opt to use negative joint angles in the c-space giving us a c-space plot like the following

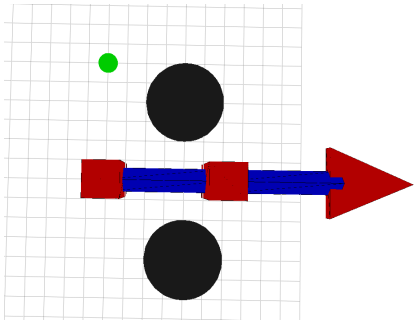


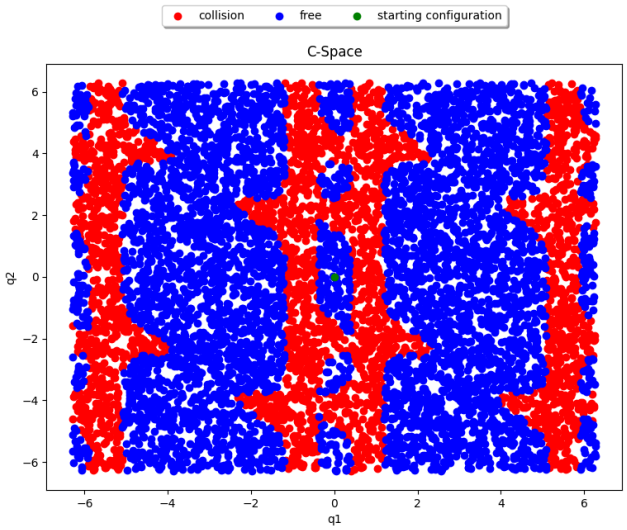

▼ you can see now how it will be very easy to get around the obstacle in c-space




even using negative rotations, the fact still holds that it it impossible to get out of some situations

▼ for example this one:




collision
free
starting configuration
C-Space
q2
q1
6
4
2
0
−2
−4
−6
−6
−4
−2
0
2
4
6