CS545 HW 3

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1.

```
A:
[3.0, 0.0, 0.0]
B:
[1.2174274866104318, 1.5560199955519716, 0.0]
C:
[2.701511529340699, 4.207354924039483, 0.0]
```

2.

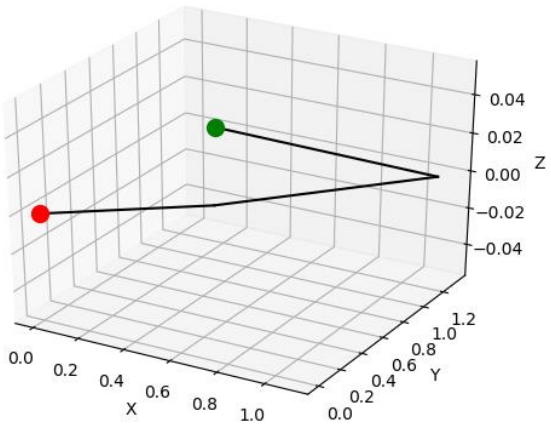

Fig. 1

3.

N/A

4.

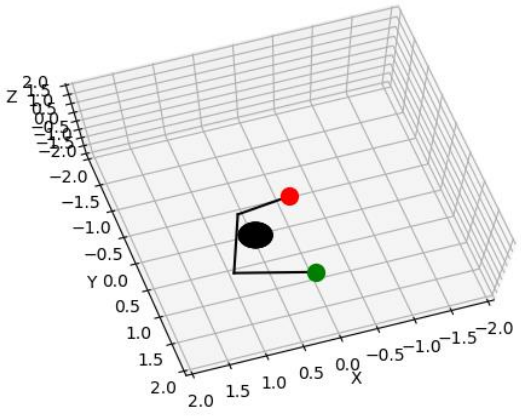

Fig. 2

5.

As shown below, when r goes larger (e.g. 0.3) the end point of arm can still somehow manage to hit the goal position, but when it is larger then a threshold (e.g. 0.4), the arm cannot hit it anymore.

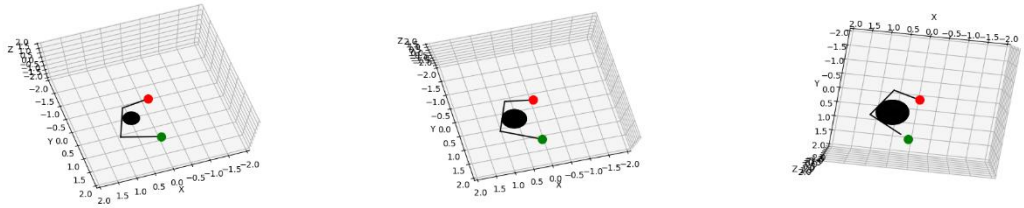

Fig. 3: r=0.2 (left), 0.3 (mid), 0.4 (right)

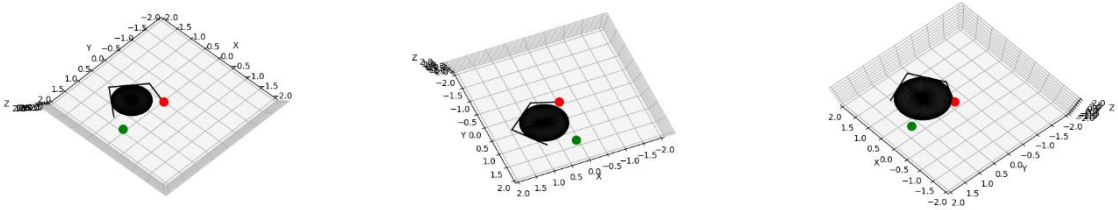

Fig. 4: r=0.5 (left), 0.6 (mid), 0.7 (right)

However, this does not mean that with a large obstacle the arm can never reach the goal position. Basically, the optimization is not a quadratic form, which means the initialization matters since

different initial states will converge to different local optimum. Now based on the observation we can change the initial state to q_0= [1.7, 0, 0], and the new result is presented below.

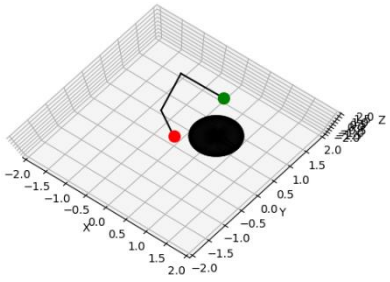

Fig. 5: r=0.5, q_0= [1.7, 0, 0]