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CS 4/5789 - PA2 Writeup

Cost of the cartpole simulations:

```
Test LQR Successfully!

Running cartpole with diffferent initializations....
case 0 average cost: 5.3386037327952O9
case 1 average cost: 145.8959098856058
case 2 average cost: 638.01917461928S6
case 3 average cost: 1779.8077542277063
case 4 average cost: 4530.734064613429
case 5 average cost: inf
case 6 average cost: inf
case 7 average cost: inf
```

4.6.1 Explanation:

As we go down initial states from 1 to 4, we are increasing the value of the 3rd element of a state. This value corresponds to the angle of the pole in radians, assumingly in respect to the conventional y-axis.

Because the value of this third index increases, the pole becomes more and more tilted as we go down the cases, until we reach case 5 which has a 1.0 radian value, or about 58 degrees.

At this point, it is incredibly difficult to correct this starting angle than if the rod was initialized as perfectly upright. This results in the increase in cost, up until the point where the angle reaches values near 90 degrees and failure of the simulation given the initial state is all but immediate.

Cost from 4.7.1:

```
D:\Code\PYTHONSTUFF\CornellRL\PA2>python cartpole.py
cost =  3.7037426395346786
```