Anthony Wang
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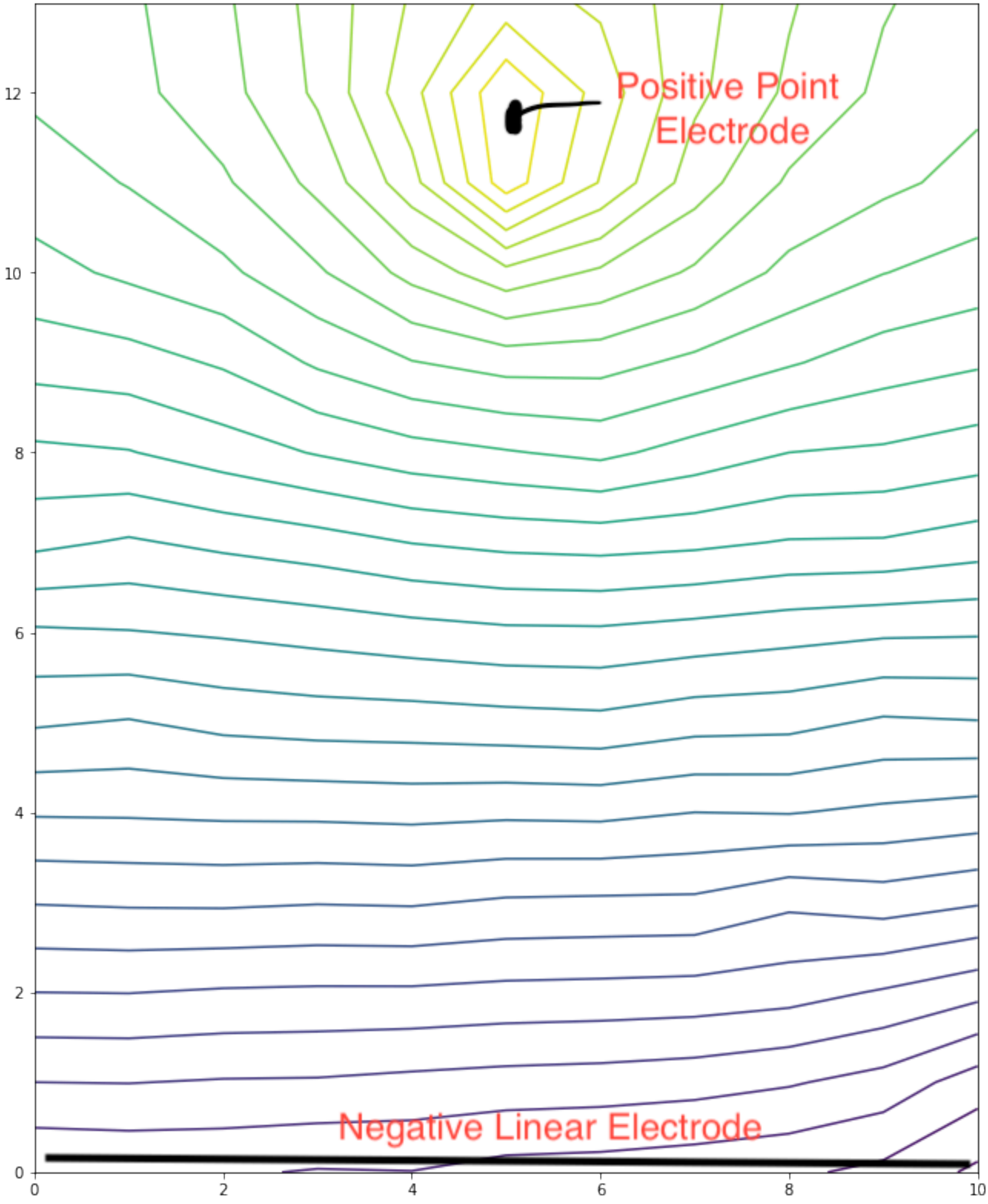
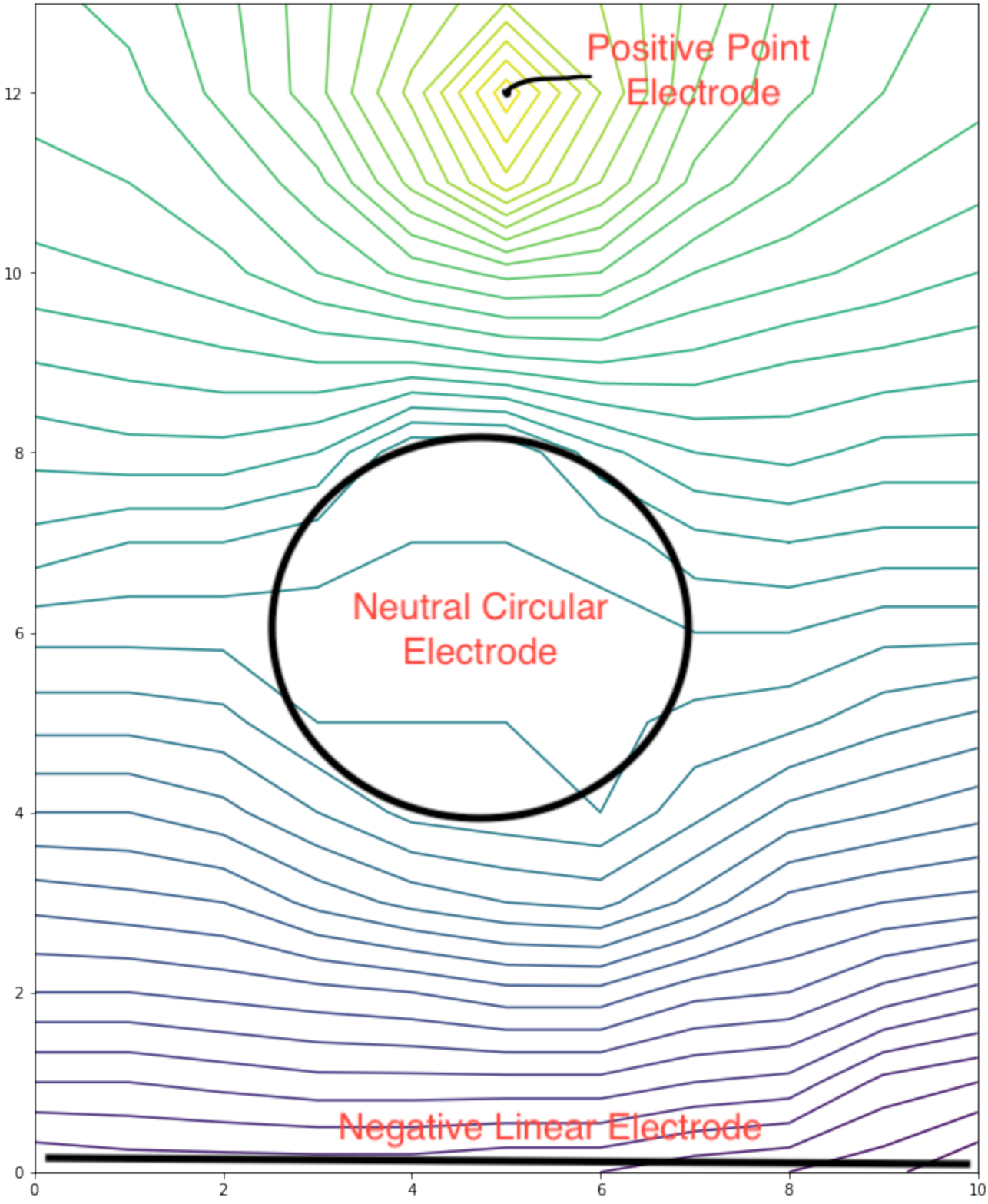
12/7/2021

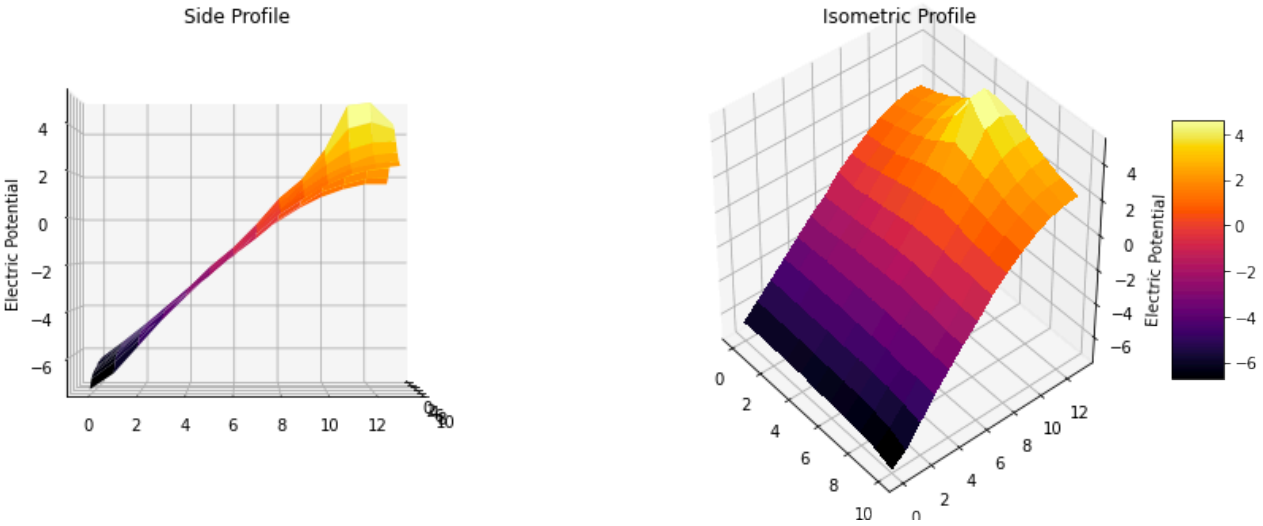
AP Physics C – Electric Field / Electric Potential Lab

Don't have excel so I did this in python

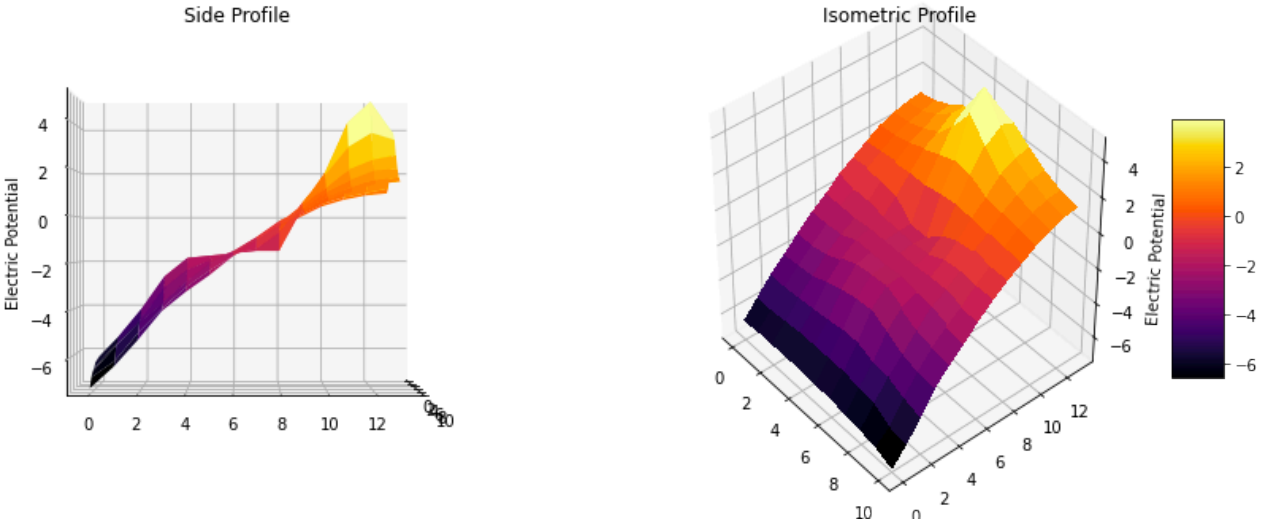

Positive Point
Electrode
Negative Linear Electrode
0
2
4
6
8
10
12
0
2
4
6
8
10

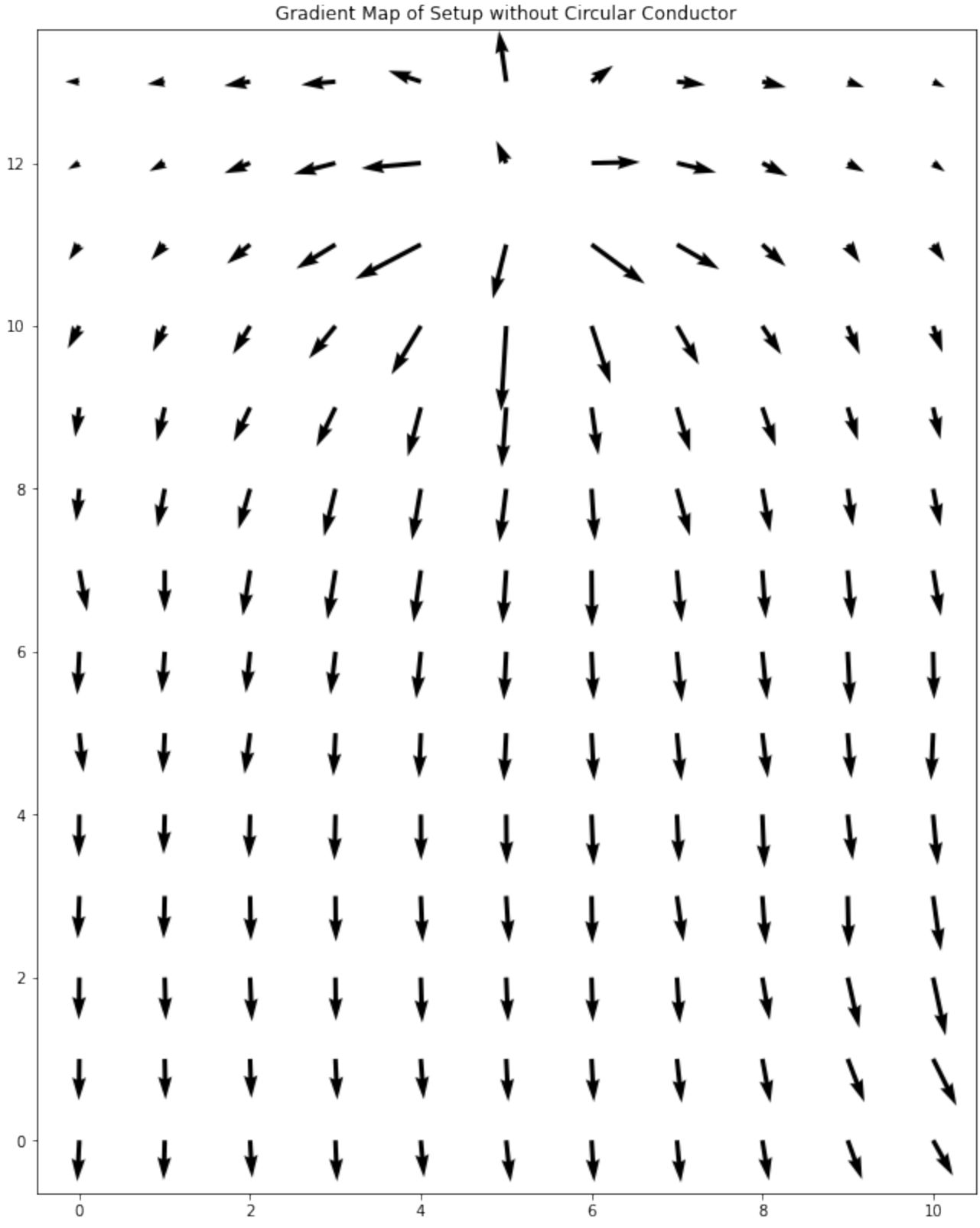

Positive Point
Electrode
Neutral Circular
Electrode
Negative Linear Electrode
0
2
4
6
8
10
12
0
2
4
6
8
10

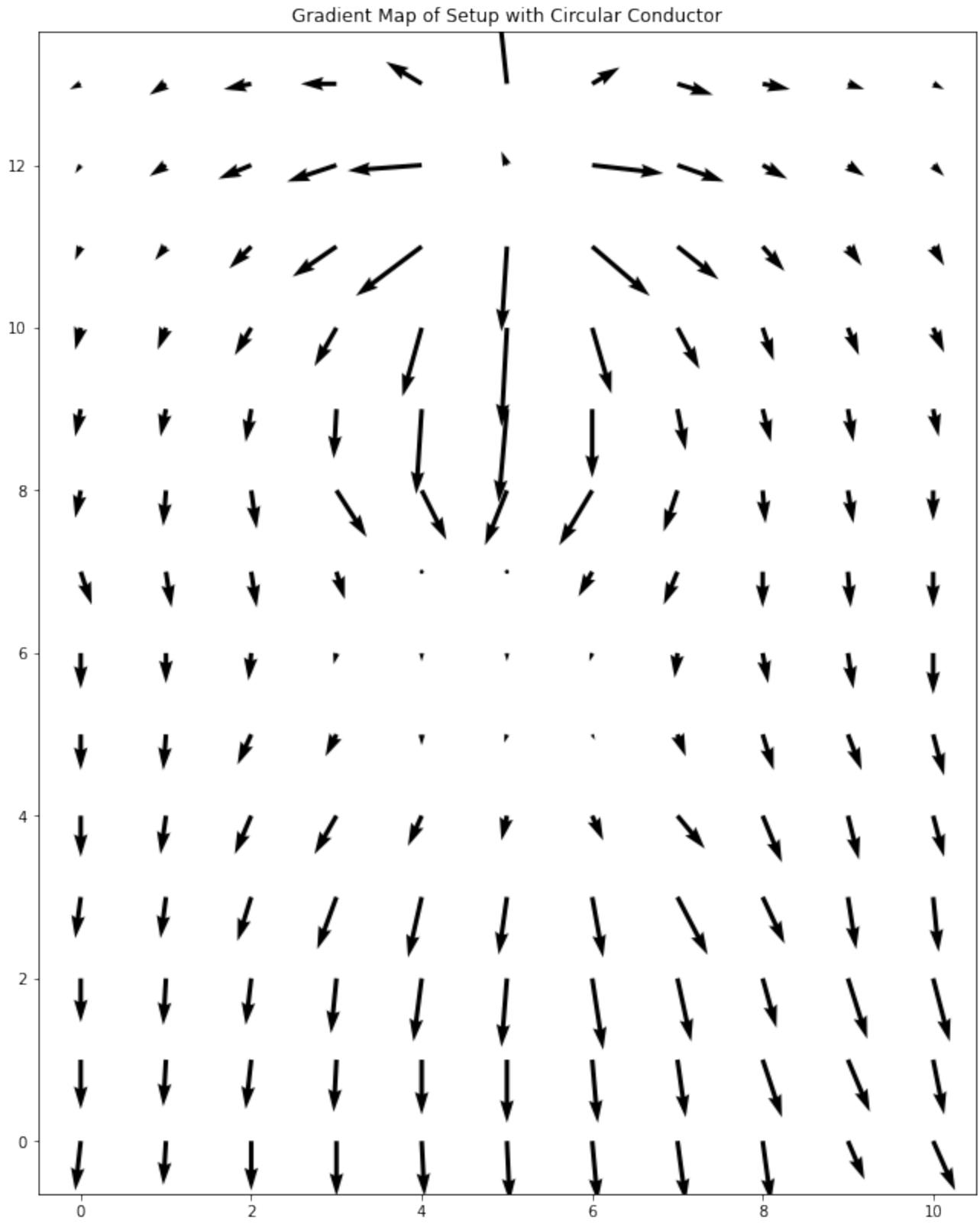
Electric Potential of Setup without Circular Conductor



Electric Potential of Setup with Circular Conductor

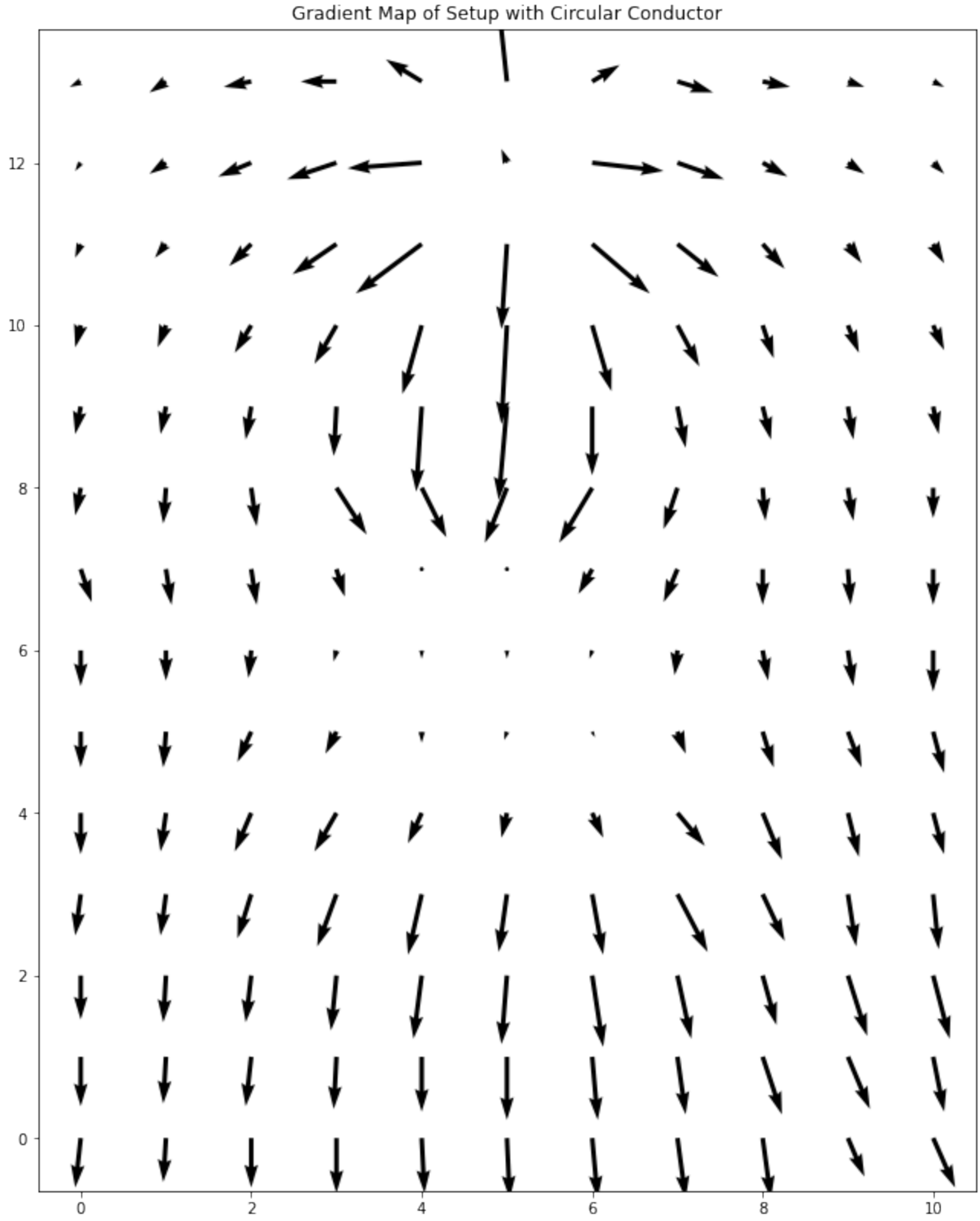



Gradient Map of Setup without Circular Conductor
12
10
8
6
4
2
0
0
2
4
6
8
10



grid resolution (r) : $1.7cm = 0.017m$

$E = \nabla V$ at $(x, y) = (\frac{E(x+r)-E(x-r)}{2r}, \frac{E(y+r)-E(y-r)}{2r})$



$E_1 = \frac{3.4V-3.6V}{2*0.017m}, \frac{4.1V-3.6V}{2*0.017m} = (-5.88, 14.7)V/m$

$E_2 = \frac{1.7V-4.5V}{2*0.017m}, \frac{1.6V-3.4V}{2*0.017m} = (-70.6, -52.9)V/m$

The circular, "hollow" neutral conductor causes the electric field to be stronger near the edges of the conductor and essentially zero at the center. The circular conductor becomes polarized due to the field and that in turn causes the field to attract to it. The field is not exactly zero in the center, possibly because the holes in the conductor could lead to the field leaking through.