

Computational Physics 3  
HW 2  
Christopher Morris

Problem 1:

For  $N = 1.000000E+02$  Mass: 0.8331799 and Mass Error: 0.2504983

For  $N = 1.000000E+02$  Volume: 0.8000000 and Volume Error: 0.2400000

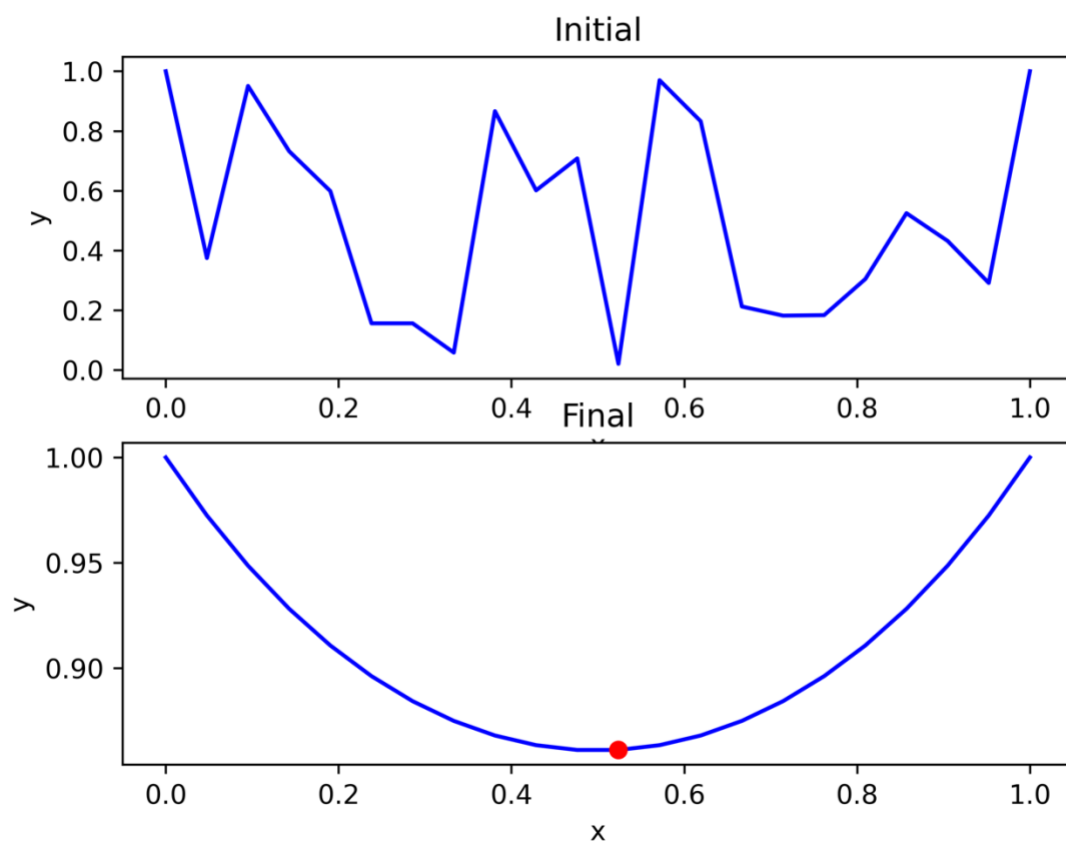
For  $N = 1.000000E+04$  Mass: 0.9300940 and Mass Error: 0.0258647

For  $N = 1.000000E+04$  Volume: 0.9184000 and Volume Error: 0.0255024

For  $N = 1.000000E+06$  Mass: 0.8944802 and Mass Error: 0.0025416

For  $N = 1.000000E+06$  Volume: 0.8840480 and Volume Error: 0.0025082

## Problem 2

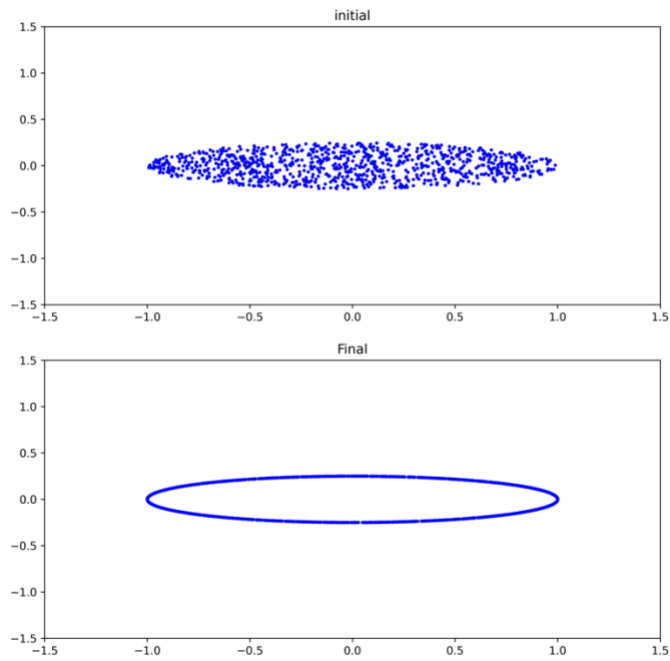


Trials: 916439 Tmin: 1.4122194516877569

Min x: 0.52, and Min y: 0.86

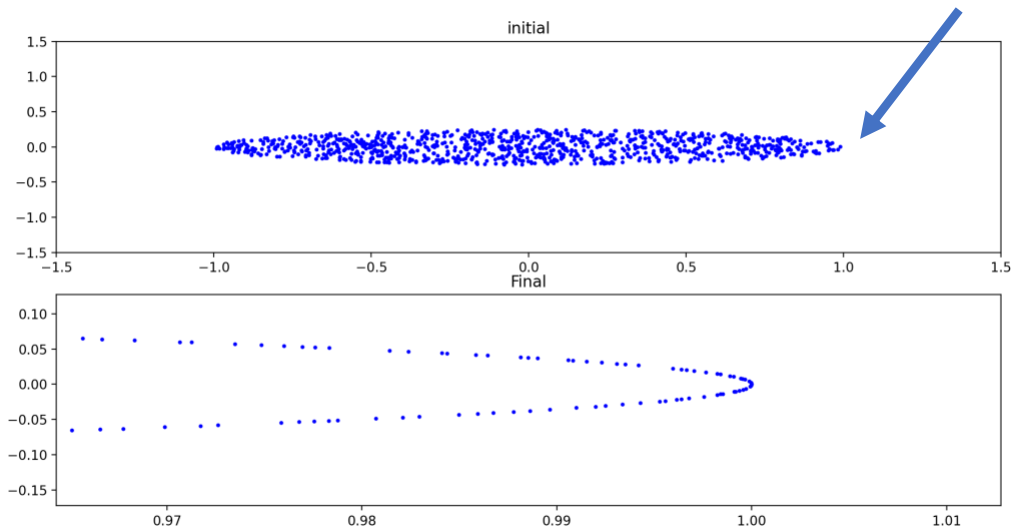
### Problem 3

a)

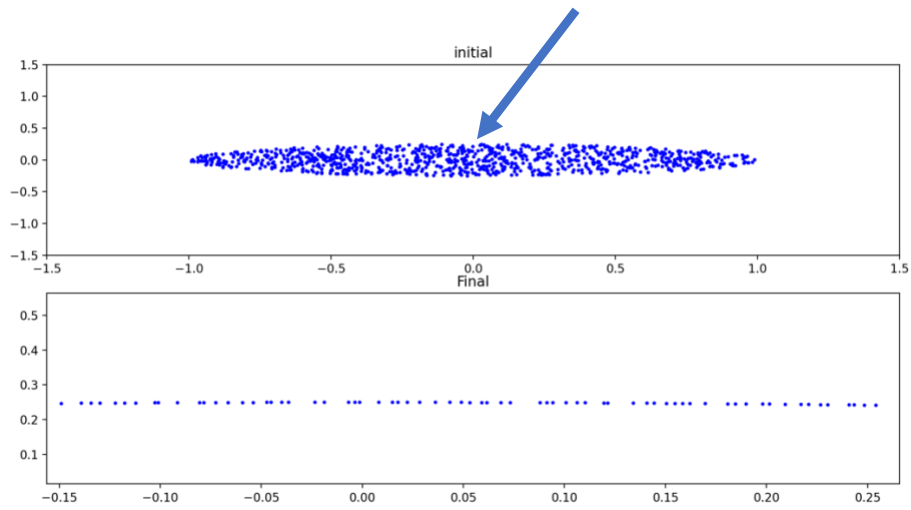


b)

For  $(a, 0)$  the estimated density is 15 per unit length.



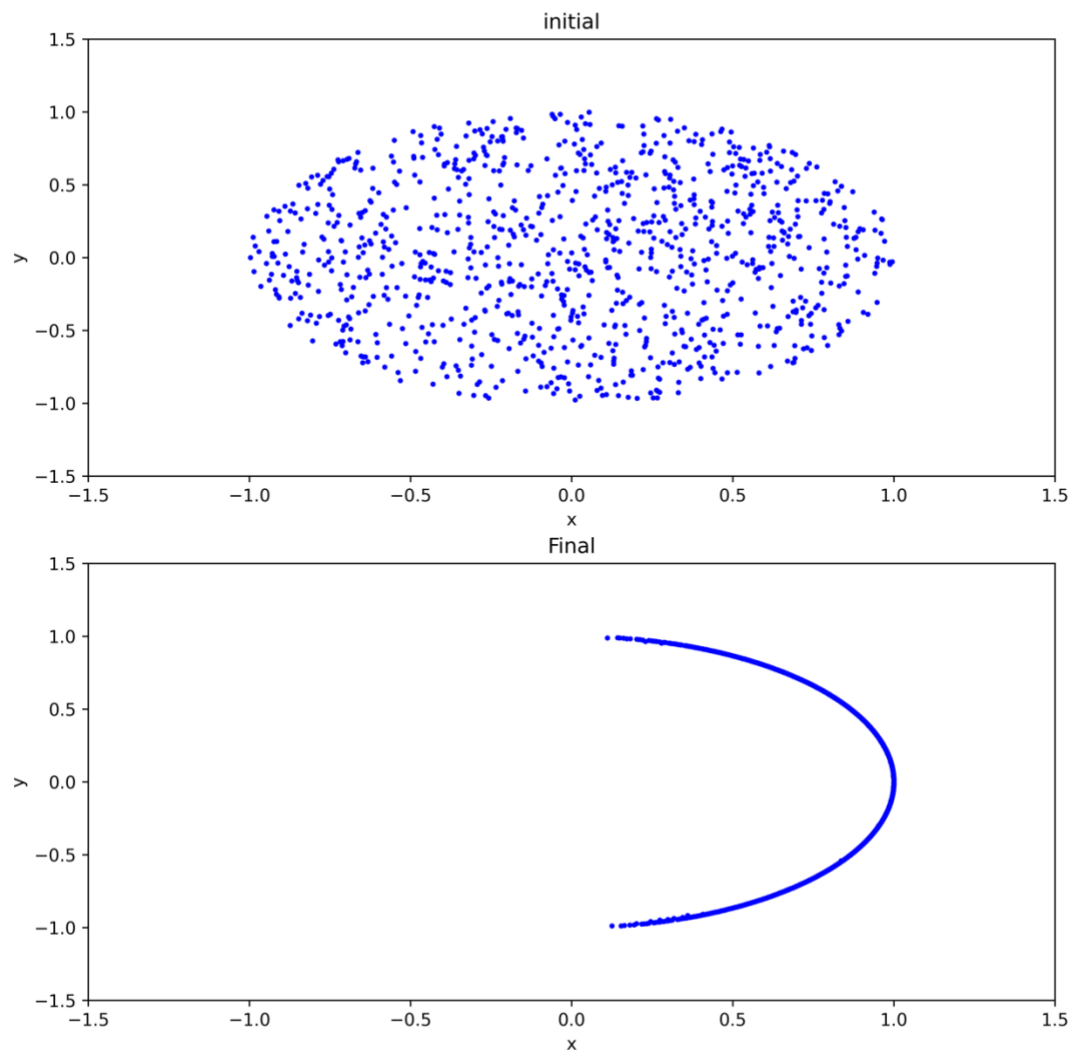
For (0, b) the estimated density is: 10



The charge density increases as the curvature increases (i.e. as the radius of curvature decreases).

#### Problem 4

a)

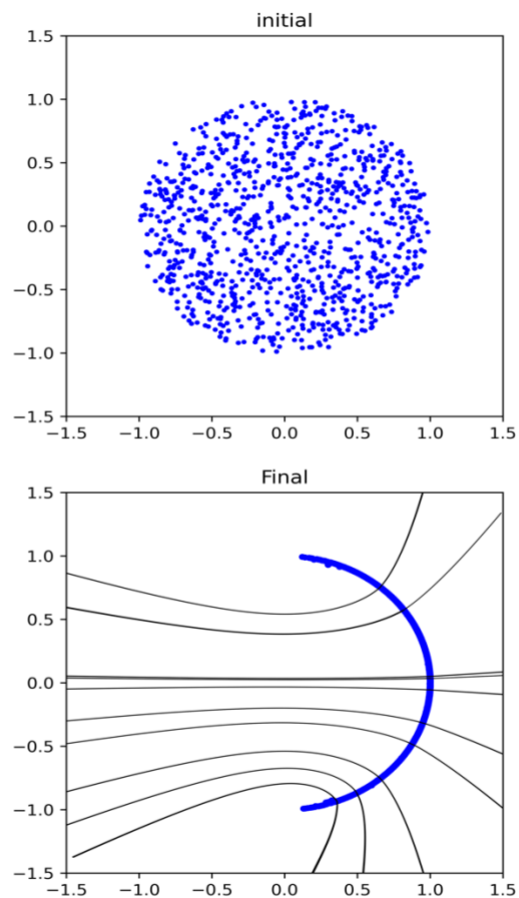


The external E field attracts the positive charges to the right side of the sphere in the direction of the external E-field.

b)

The Ex field at the origin **before** adding external: -7051128.003985247 and the Ey field:12454.52482538683

The Ex field at the origin with external: 2948871.9960147534 and the Ey field:12454.52482538683



The E field should be zero at the center; however, numerically with the added external E field in the Ex component, the measured Ex,Ey components are :

Ex: 2948871.9960147534

Ey: 12454.52482538683