Computational Physics 3

HW 2

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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

Chart, line chart, histogram

Description automatically generated

Trials: 916439 Tmin: 1.4122194516877569

Min x: 0.52, and Min y: 0.86

Problem 3

a)

Graphical user interface

Description automatically generated with low confidence

b)

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

A picture containing graphical user interface

Description automatically generated

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

Graphical user interface, application

Description automatically generated

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

Problem 4

a)

Chart, scatter chart

Description automatically generated

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

Chart

Description automatically generatedThe 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