HIP 4

A wire bent to make the shape of an L 15cm on each side is charged to 50μC.

1. Derive an analytical function that finds the potential everywhere.
2. Create a VPython program that uses numerical integration to calculate the potential at positions one cm apart everywhere within a space 20cm by 20 cm large that contains the charged wire.
3. Use your results in part a and part b to conduct a reasonableness test.

Submit a hardcopy of your analytical solution, your VPython program, and a discussion of your reasonableness test.

**Exam 1 Exam Extra Credit –– Group submissions are acceptable – Due end of Week 5**

1. (3 points) Modify the program you made above in order to make it display an elevation graph of the potential at each point.
2. (3 points) Modify the program above so that it becomes a good teaching tool to explain what numerical and analytical integration really is.
3. (3 points) Continue to modify the program above so that it displays both the E-field and potential at each point in the 20cm by 20cm grid.
4. (3 points) Keep continuing to modify the program above so that it becomes a good teaching tool to explain what numerical and analytical vector integration really is.

To submit the Extra Credit work, turn in a hardcopy of your code and screenshots of the output AND e-mail the program with “Exam 1 Extra Credit” in the subject line. If you are submitting work as a group, include a cover sheet that gives the name and major of everyone in the group along with a brief description of their contribution to the project.

**Goals of Chapter 25:**

* You should be able to derive the electric potential of a point charge.
* You should be able to graphically represent electric potential in at least four different ways include: a potential graph, equipotential surfaces, a contour map and an elevation graph.
* You should understand what analytical and numerical integration really means.
* You should be able to use integration to find the potential of a continuous distribution of charge.