Mathematical Physics - PHY307 Fall 2010

Prof. D. Garanin Assignment 2

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1. Produce contour and 3D plots of the electric potential created by three equal charges placed at the corners of an equilateral triangle in the x, y plane. Where the potential is higher, at the middles of the triangle sides or at the center of the triangle? Do the same for the four charges placed at the corners of a square. Plot the potential along the z axis in both cases.

2. Produce a plot explaining derivatives (similar to that in the lecture notes) with Mathematica

3. Check the formulas for the first and second derivatives

$$\begin{aligned} \frac{-f[x+2h]+8f[x+h]-8f[x-h]+f[x-2h]}{h} &= \frac{df[x]}{dx}+O[h^4] \\ \frac{f[x+h]-2f[x]+f[x-h]}{h^2} &= \frac{d^2f[x]}{dx^2}+O[h^2] \end{aligned}$$