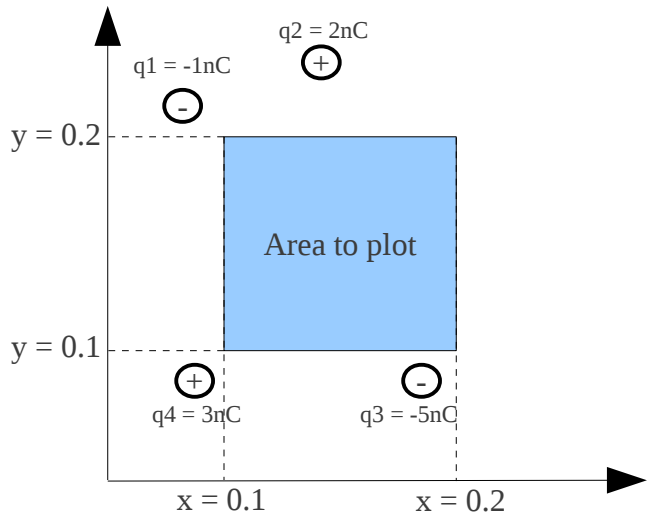
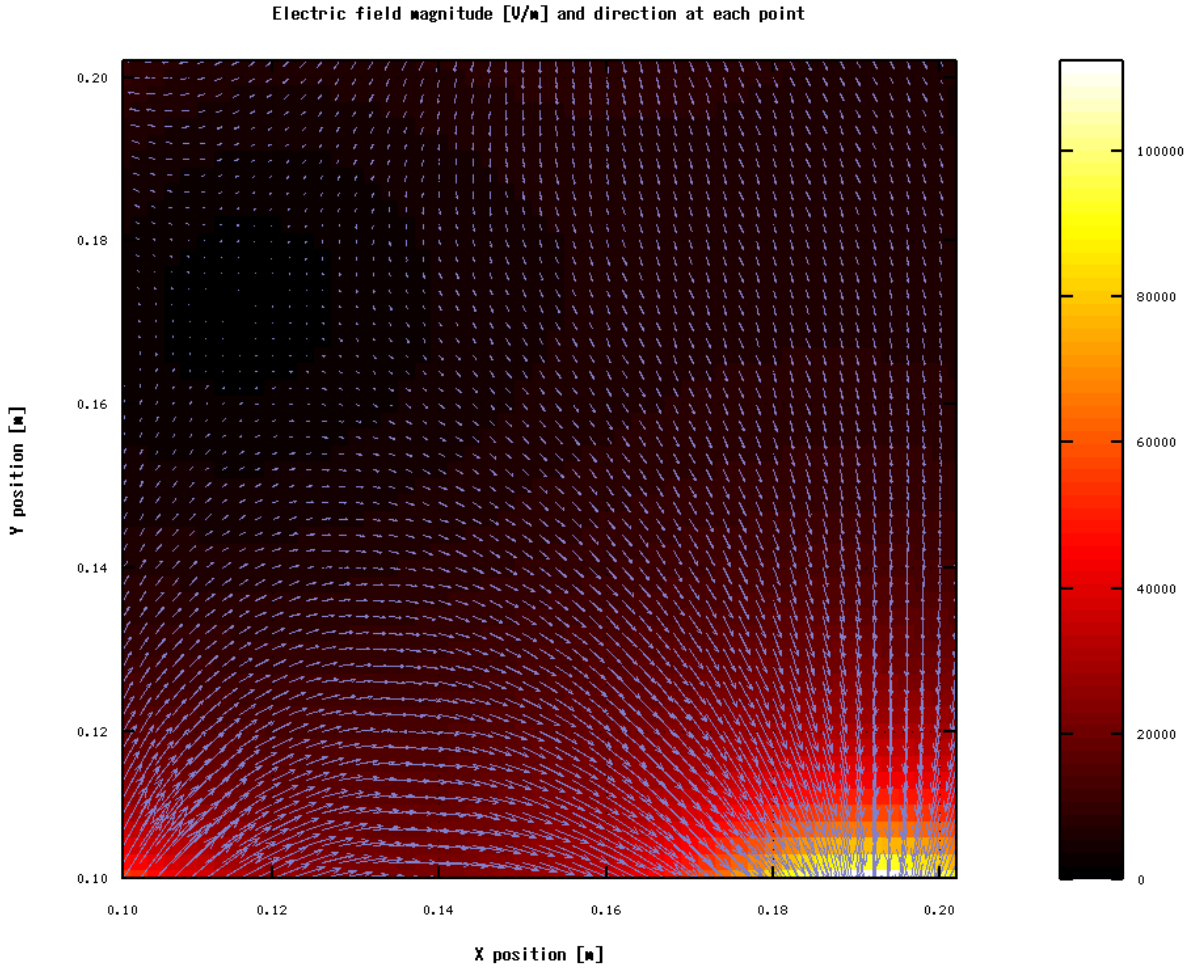
**Homework #1 solution key**

**Problem #1:**

1)



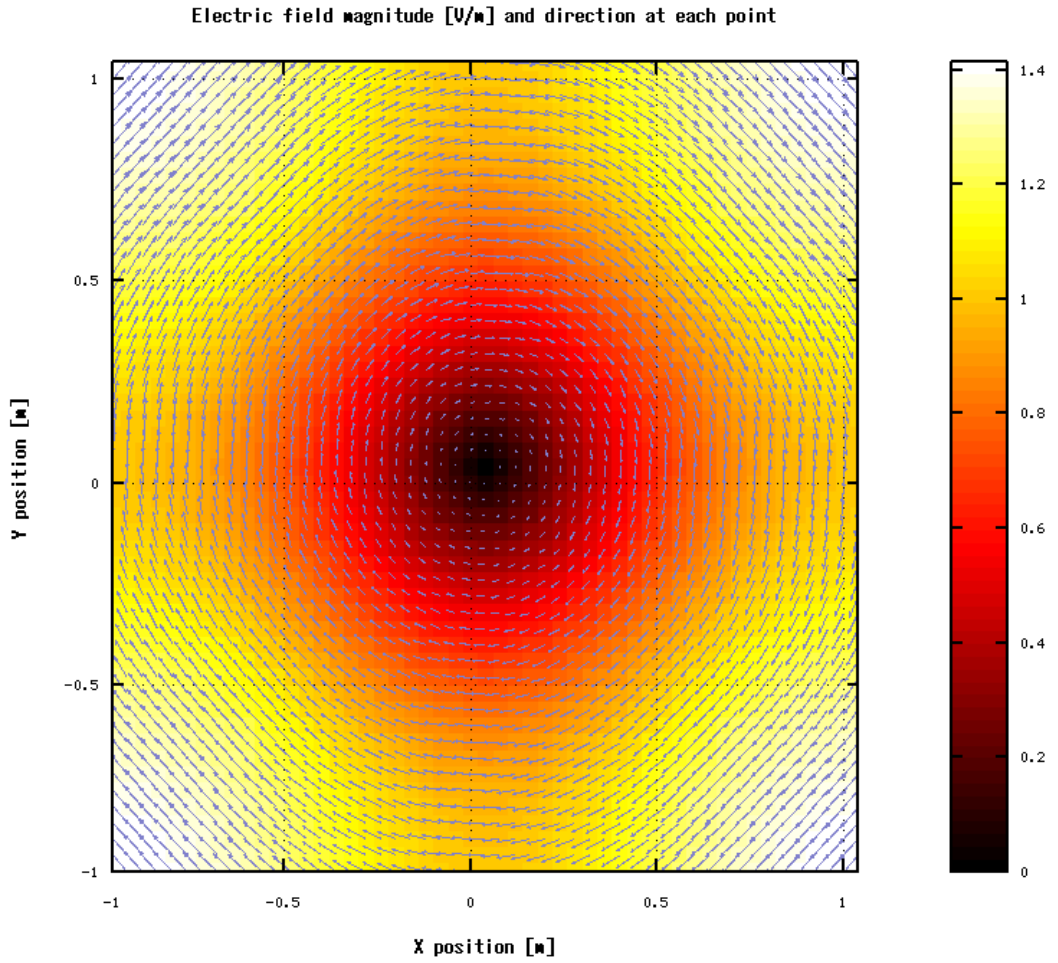

2)



3) The expression given will result in a division by zero which will crash the program. This happens because the formula applies to real world measurements, in which the distance will never be zero (it will be the radius of the charged particle in the worst case), but we are considering ideal point charges. The approach that can be taken is to skip the calculation for the current charge at the current point if the distance between the charge position and the point considered is less than the resolution of our mesh.

**Problem # 2:**

1)




2)

DIV E = 0

3) There are no electric charges in the region. Since the arrows (field lines) do not converge to (or diverge from) a point, but are circulating around themselves in a closed loop instead, this field has not been generated by electric charges but by time-varying magnetic fields.