Exam 1 Skills Expectations *(Chapter it was covered in)*
Note - Do not assume this is all inclusive!

Physics Skills

- Calculate \( \mathbf{F}, \mathbf{E}, Q \) from given charge distribution \((2,3)\).
  - Point charges
  - Continuous charge distributions

- Use (integral form of) Gauss’ Law to calculate \( \mathbf{E} \) from charge distribution for systems with sufficient symmetry \((4)\).
  - Spheres
  - Sheets
  - Lines
  - Points

- Find flux through a surface given the field or charge distribution \((4)\).

- Be able to calculate \( \mathbf{E} \) and \( \rho \) from knowledge of the other \((3,4)\).

- Sketch field lines given charge distribution or field \((3,4)\).

- Calculate particle motion in electrostatic fields \((\text{Homeworks})\).

- Differential form of Gauss’ law for the divergence of \( \mathbf{E} \) \((4)\), expression for curl of \( \mathbf{E} \) \((5)\), and how they are used.

- Determine if a given electric field can be an electrostatic field \((5)\).

- Take limits and/or use expansion techniques to investigate special cases of electric fields \((3,4,\text{Homeworks})\).

- Know units of all quantities studied thus far \((1,2,3,4)\).

Mathematical Skills \((\text{All Chapters and Homeworks})\)

- Definition and manipulations of position vectors and relative position vectors.

- Grad, div, curl - physical interpretation

- Grad, div, curl - calculations

- Divergence theorem - physical interpretation and calculations

- Calculations of line integrals, area integrals (of scalars and vectors), volume integrals

- Carry out integrals necessary to derive \( \mathbf{F} \) and \( \mathbf{E} \) from charge distributions.

- All of the above in rectangular, polar, and spherical coordinates