Electromagnetc Theory: PHYS330

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Summary

Week 2 Summary

1. Homework discussions
    - Proofs! Glorious proofs.
    - Exercises with *checking* fundamental theorems
2. Electrostatics and Coulomb forces
    - Charge distributions, superposition, and the Coulomb force
    - A note about the *far-field*
    - Setting up integrals, taking limits, checking units
    - The divergence of electric fields
    - The curl of electric fields
3. Electric Potential
    - Definitions, fundamental theorem for gradients
    - Reference points
    - Laplace equation ...
4. Work, energy, and conductors

Homework

Homework, Week 2

Unlike last week, these exercises come from *within* the chapter. Ideally, you should look at all of the problems within the chapter as you study.

- Exercise 2.5
- Exercise 2.6
- Exercise 2.9
- Exercise 2.12
- Exercsie 2.16
- Exercise 2.18
- Exercise 2.25
- Exercise 2.29

Charge distributions, Superposition, and the Coulomb Force

Charge distributions, Superposition, and the Coulomb Force

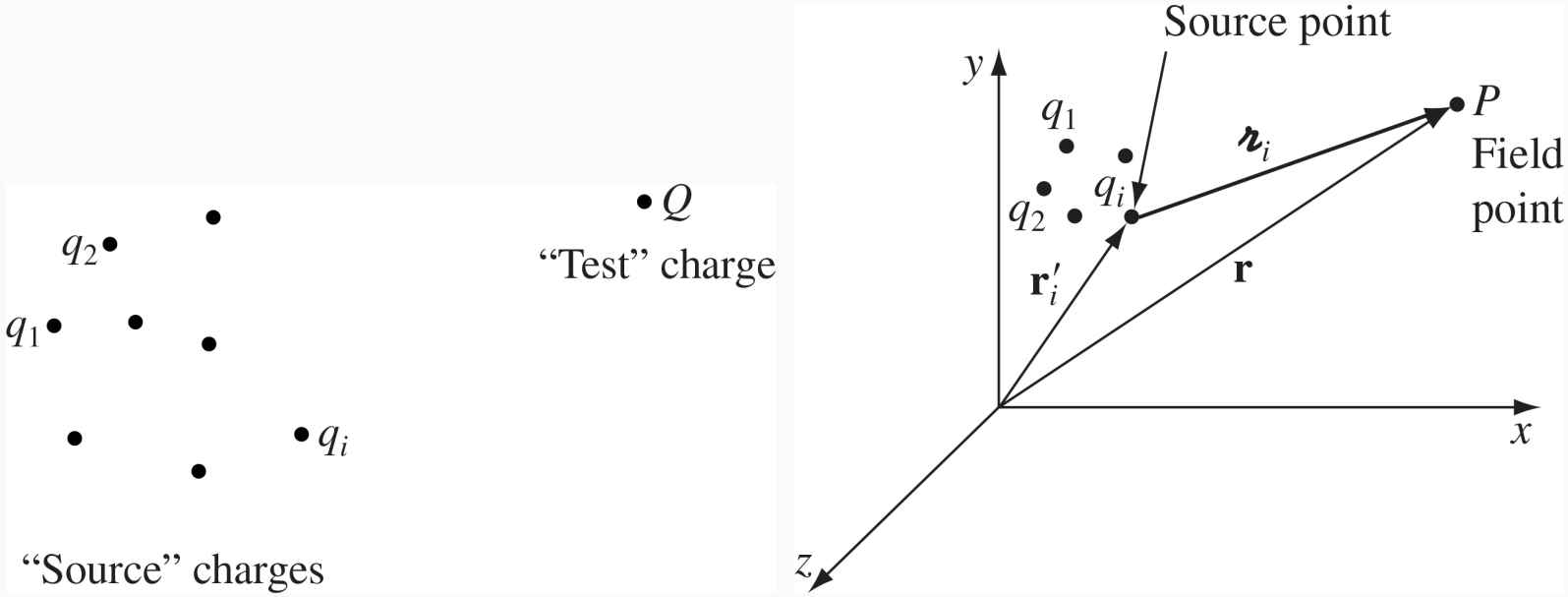

Figure 1: The basic problem of electrostatics. Note the definition of the separation vector, and the vectors to the field point and to all the source charges.

Charge distributions, Superposition, and the Coulomb Force

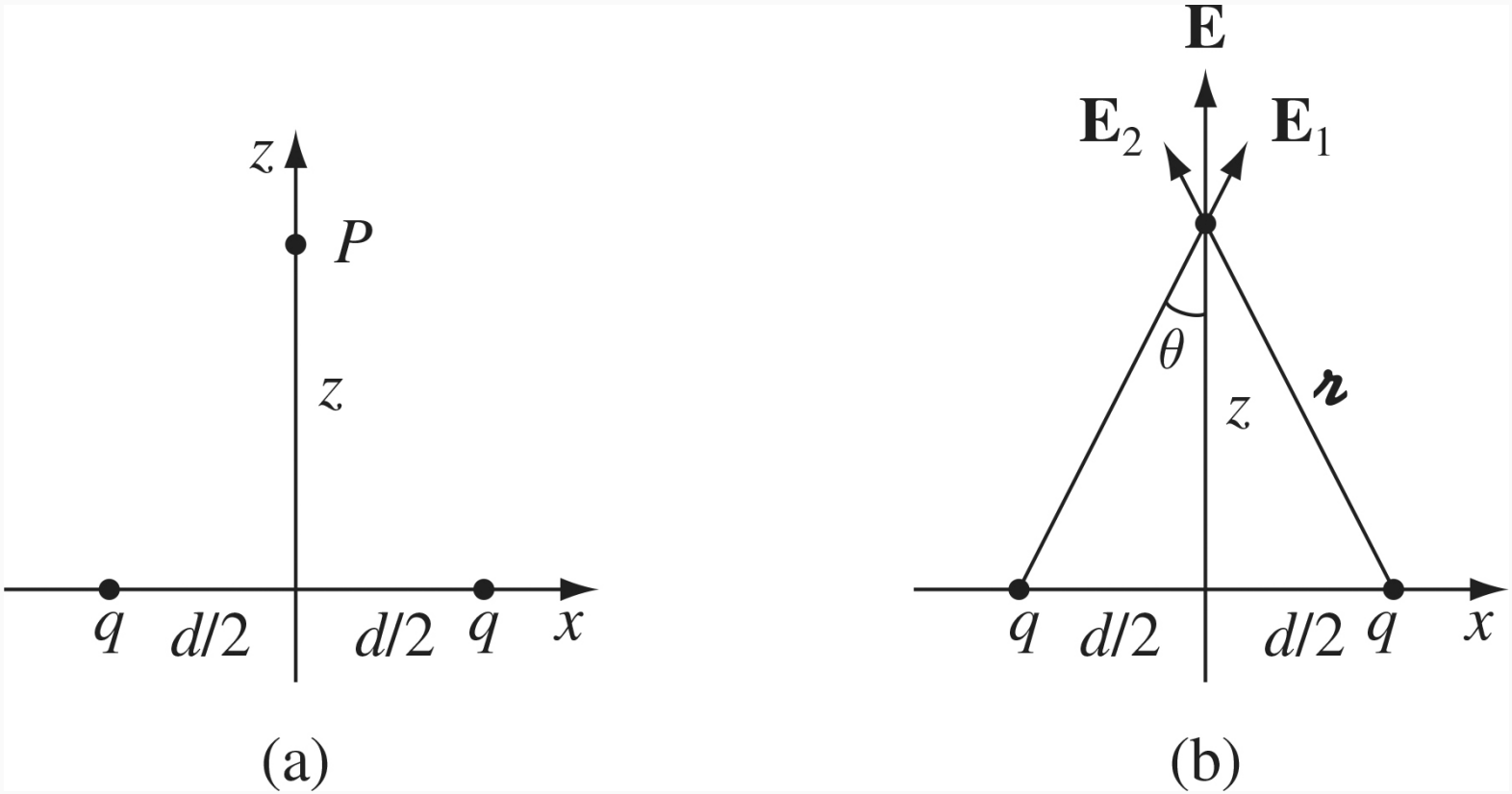

Figure 2: Begin with a dipole, and then a *physical* dipole.

Charge distributions, Superposition, and the Coulomb Force

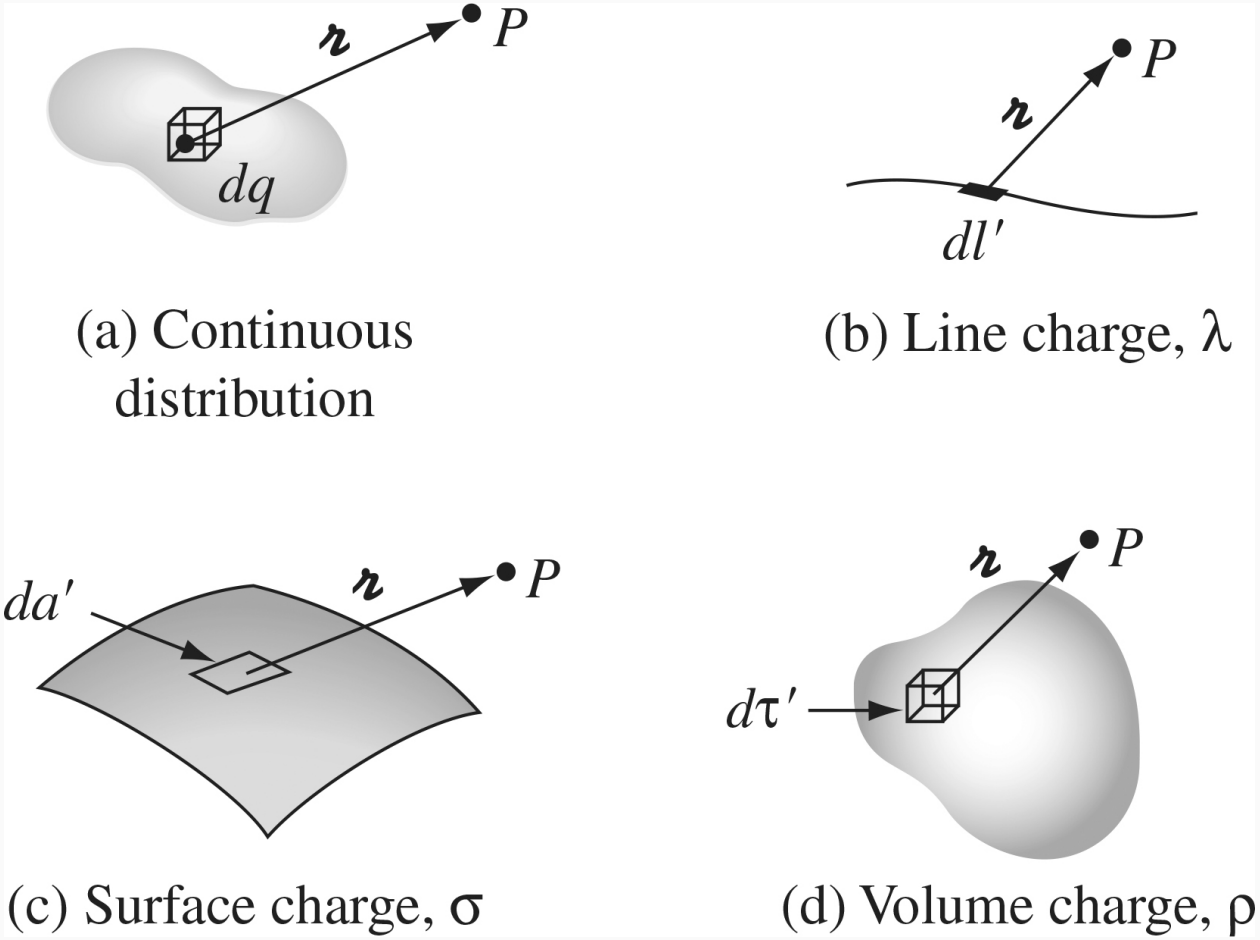

Figure 3: The continuous limit implies a variety of symmetries and geometries over which we integrate, rather than sum.

Charge distributions, Superposition, and the Coulomb Force

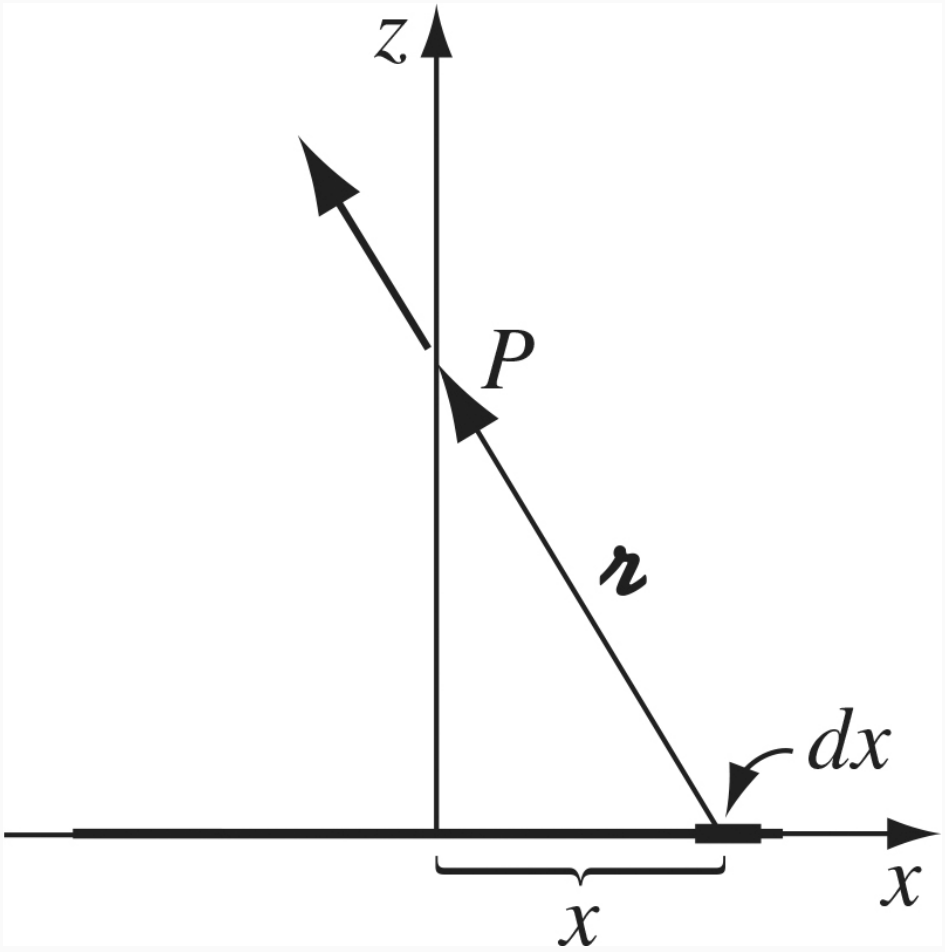

Figure 4: A coninuous line density of charge. Integration yields the electric field.