

**Problem 4.10** Three point charges, each with  $q = 3 \text{ nC}$ , are located at the corners of a triangle in the  $x$ - $y$  plane, with one corner at the origin, another at  $(2 \text{ cm}, 0, 0)$ , and the third at  $(0, 2 \text{ cm}, 0)$ . Find the force acting on the charge located at the origin.

**Solution:** Use Eq. (4.19) to determine the electric field at the origin due to the other two point charges [Fig. P4.10]:

$$\mathbf{E} = \frac{1}{4\pi\epsilon} \left[ \frac{3\text{nC} (-\hat{\mathbf{x}}0.02)}{(0.02)^3} \right] + \frac{3\text{nC} (-\hat{\mathbf{y}}0.02)}{(0.02)^3} = -67.4(\hat{\mathbf{x}} + \hat{\mathbf{y}}) \text{ (kV/m) at } \mathbf{R} = 0.$$

Employ Eq. (4.14) to find the force  $\mathbf{F} = q\mathbf{E} = -202.2(\hat{\mathbf{x}} + \hat{\mathbf{y}}) \text{ } (\mu\text{N})$ .

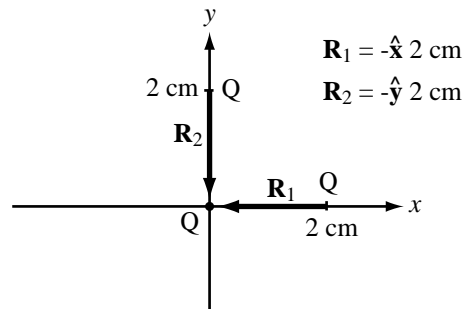


Figure P4.10: Locations of charges in Problem 4.10.