Electric field due to point charges; superposition

1. Consider two charges with \( q_1 = -1 \text{nC} \) (left) and \( q_2 = +1 \text{nC} \) (right) separated by 2 mm, as in the figure below; \( 1 \text{nC} = 10^{-9} \text{C} \) (nano-Coulomb).

Find the direction of the field at each of the 5 points indicated in the graph and listed below, and show your work to instructor (all distances are in mm):

(a) \((0, 0)\)
(b) \((1.25, 0)\)
(c) \((-1.25, 0)\)
(d) \((0, 1)\)
(e) \((0, -1)\)

Calculate the magnitude of the field at each of those points, and show your work.
2. the same, if both charges are positive $q_1 = q_2 = +1 \, nC$.

Show your work separately for directions and for the magnitudes:

(a) (0, 0)
(b) (1.25, 0)
(c) (-1.25, 0)
(d) (0, 1)
(e) (0, -1)