4. Magnetic field (6 points)

Magnetic field with inductance B (parallel to the z-axis) fills the region $x^2 + y^2 < R^2$. Let us consider an electron of velocity $v = RBe/m$ (where e is its charge and m — its mass).

1) Sketch the trajectory of the particle, if initially, it moves along the line $y = 0$ towards the region filled with magnetic field.

2) How long time does the electron spend inside the magnetic field?

3) Now, let us consider the situation, when initially the electron moves along the line $y = a$ $(a < R)$. Find the angle α, by which the electron is inclined after passing through magnetic field.