Fundamentals of Physics (2020-2021)
Task 9: Magnetostatics

Determine if the following sentences are **true** or **false**. **Justify your answer**.

1. A particle with charge q and velocity $\vec{v} = (0, v_y, 0)$ enters a region of the space with an homogeneous magnetic field $\vec{B} = (0, 0, B_z)$, where v_y and B_z are positive constants. In this situation, the particle will describe a rectilinear motion with velocity $\vec{v}$.

2. In a region of the space there is a uniform magnetic field $\vec{B} = (0, 0, -B)$ and a uniform electric field $\vec{E} = (0, -E, 0)$. A negative charge travelling by this region with velocity $\vec{v} = (v, 0, 0)$, where $v > \frac{E}{B}$, will have an acceleration pointing in the negative direction of the y-axis. Consider B, E and v as positive constants.

3. The system of the figure below consists on two current lines of intensities I_1 and I_2, with $I_1 = \frac{3}{2} I_2$. The magnitude of the magnetic field created by wire 1 on the point A is equal to the magnitude of the magnetic field created by the wire 2 on the same point.

4. In the system of the figure, with two current lines of intensities I_1 and I_2, with $I_1 = \frac{3}{2} I_2$, the total magnetic field at point A is zero.