Exercise 3.1

Calculate the H-field and B-field at a distance of 2 m from an infinitely long straight wire, in which 1 A (effective) alternating current is running with a frequency of 50 Hz. Use Ampere's law and give the answer in an correct engineering manner (SI-prefixes, etc.).

Exercise 3.2

A magnetic field is given by:

$$\bar{B} = \begin{Bmatrix} 15 \\ 15 \\ -10 \end{Bmatrix} \quad [\frac{mWb}{m^2}]$$

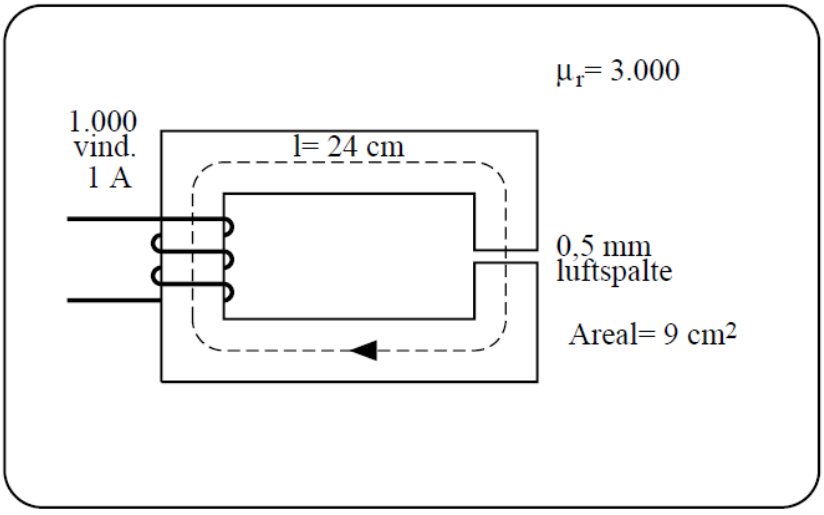
A wire goes from the point (0,7,0) to the point (7,0,1).

a. Calculate the force exerted on the wire per Ampere of current that passes through it.

b. Are the magnetic field and the wire perpendicular to each other?

Exercise 3.3

Draw a magnetic equivalent circuit for the transformer core in the figure and calculate the following quantities, assuming that the iron is linear (i.e., μ is considered as a constant):



a. The reluctance of the iron core.

b. The reluctance of the air gap, taking into account a 10% increase in the gap area.

c. The magnetic flux in the iron as well as in the air gap.