Question 1 (3 points)

In an oscillating LC circuit in which \( C = 4.00 \mu F \), there is a maximum potential difference of 1.50 V between the plates of the capacitor and a maximum current through the inductor of 50 mA. Find the inductance of the circuit.

The total energy is constant and can be expressed as the maximum energy stored in the capacitor or inductor. Thus,

\[
\frac{1}{2} CV^2 = \frac{1}{2} LI^2 ,
\]

\[
L = \frac{CV^2}{I^2} = 3.6 \text{mH} .
\]

Question 2 (3 points)

Assume the average value of the vertical component of Earth’s magnetic field is 63 \( \mu T \) (downward) in some region that has an area of 3.19\( \times 10^5 \) km\(^2\); and calculate the net magnetic flux (in webers) through the rest of Earth’s surface (the entire surface excluding that region). Take the negative direction to be inward.

Since the total flux through the surface of the earth is zero, the flux through the rest is the negative of the flux given,

\[
\Phi = -(\text{AB}) = 2 \times 10^7 \text{Wb} .
\]