b)
$$\begin{cases} I_1 = I_2 = I \\ \mathcal{E}' = \underbrace{\mathcal{E}_1 + \mathcal{E}_2}_{\text{Same sign}} = -L_1 \frac{dI_1}{dt} - M \frac{dI_2}{dt} - L_2 \frac{dI_2}{dt} - M \frac{dI_1}{dt} \end{cases}$$

(1) and (2)

$$\mathcal{E}' = -(L_1 + 2M + L_2) \frac{dI}{dt}$$

This is equivalent to a single coil with:

$$L' = L_1 + L_2 + 2M$$

c) $I_1 = I_2 = -I$

$$\mathcal{E}'' = \mathcal{E}_1 - \mathcal{E}_2 = -L_1 \frac{dI_1}{dt} - M \frac{dI_2}{dt} + L_2 \frac{dI_2}{dt} + M \frac{dI_1}{dt} =$$

$$= -(L_1 - L_2 - 2M) \frac{dI}{dt}$$

$$L'' = L_1 + L_2 - 2M$$

The self-inductance must be positive (otherwise any change in I would result in more current in the same direction... against Lenz's law, against energy conservation)

Therefore

$$L' > L'' \geq 0 \quad , \quad M \leq \frac{L_1 + L_2}{2}$$