

**Chapter 6, Solution 59.**

$$(a) \quad v_s = (L_1 + L_2) \frac{di}{dt}$$

$$\frac{di}{dt} = \frac{v_s}{L_1 + L_2}$$

$$v_1 = L_1 \frac{di}{dt}, \quad v_2 = L_2 \frac{di}{dt}$$

$$v_1 = \frac{L_1}{L_1 + L_2} v_s, \quad v_2 = \frac{L_2}{L_1 + L_2} v_s$$

$$(b) \quad v_1 = v_2 = L_1 \frac{di_1}{dt} = L_2 \frac{di_2}{dt}$$

$$i_s = i_1 + i_2$$

$$\frac{di_s}{dt} = \frac{di_1}{dt} + \frac{di_2}{dt} = \frac{v}{L_1} + \frac{v}{L_2} = v \frac{(L_1 + L_2)}{L_1 L_2}$$

$$i_1 = \frac{1}{L_1} \int v dt = \frac{1}{L_1} \int \frac{L_1 L_2}{L_1 + L_2} \frac{di_s}{dt} dt = \frac{L_2}{L_1 + L_2} i_s$$

$$i_2 = \frac{1}{L_2} \int v dt = \frac{1}{L_2} \int \frac{L_1 L_2}{L_1 + L_2} \frac{di_s}{dt} dt = \frac{L_1}{L_1 + L_2} i_s$$