

$$1) L = 12 \text{ mH}$$

$$I = 5 - 3e^{(-4t)} \text{ A}$$

The voltage across an inductor is given by

$$V_L = L \frac{dI_L}{dt}$$

$$\frac{dI}{dt} = \frac{d}{dt} (5 - 3e^{(-4t)}) = 12e^{-4t} \Rightarrow V_L = L \cdot 12e^{-4t}$$

Inversely Energy is Power is given by  $P = VI$

$$E = \int_0^t P(t) dt$$

$$\rightarrow E = \int_0^t L \cdot 12e^{-4t} (5 - 3e^{-4t}) dt$$

$$\rightarrow 12L \int_0^t 5e^{-4t} - 3e^{-8t} dt$$

$$\rightarrow 12L \left[ 5 \left( \frac{e^{-4t}}{-4} \right)_0^t - 3 \left( \frac{e^{-8t}}{-8} \right)_0^t \right]$$

$$E = 12 \cdot L \left[ -\frac{5}{4} (e^{-4t} - 1) + \frac{3}{8} (e^{-8t} - 1) \right]$$