Chapter 7, Solution 20.

(a) $\tau = \frac{L}{R} = \frac{1}{50} \longrightarrow R = 50L$

$v = -L\frac{di}{dt}$

$90e^{-50t} = -L(30)(-50)e^{-50t} \longrightarrow L = \mathbf{60\ mH}$

$R = 50L = \mathbf{3\ \Omega}$

(b) $\tau = \frac{L}{R} = \frac{1}{50} = \mathbf{20\ ms}$

(c) $w = \frac{1}{2}Li^2(0) = \frac{1}{2}(0.06)(30)^2 = \mathbf{27\ J}$

The value of the energy remaining at 10 ms is given by:

$w_{10} = 0.03(30e^{-0.5})^2 = 0.03(18.196)^2 = 9.933$ J.

So, the fraction of the energy dissipated in the first 10 ms is given by:

(27–9.933)/27 = 0.6321 or **63.21%**.