69. (a) We are told

$$e^{-bt/2m} = \frac{3}{4} \quad \text{where} \quad t = 4T$$

where $T = 2\pi/\omega' \approx 2\pi\sqrt{m/k}$ (neglecting the second term in Eq. 16.41). Thus,

$$T \approx 2\pi\sqrt{(2.00\,\text{kg})/(10.0\,\text{N/m})} = 2.81\,\text{s}$$

and we find

$$\frac{b(4T)}{2m} = \ln\left(\frac{4}{3}\right) = 0.288 \quad \Longrightarrow \quad b = \frac{2(2.00)(0.288)}{4(2.81)} = 0.102 \text{ kg/s} \ .$$

(b) Initially, the energy is $E_\text{o} = \frac{1}{2}kx_{m\,\text{o}}^2 = \frac{1}{2}(10.0)(0.250)^2 = 0.313$ J. At $t = 4T$, $E = \frac{1}{2}k(\frac{3}{4}x_{m\,\text{o}})^2 = 0.176$ J. Therefore, $E_\text{o} - E = 0.137$ J.