

$$\#1. T = \frac{2\pi}{\sqrt{128}} \approx 0.555 \text{ sec}$$

$$\#2. k = 320 \text{ N/m}, f = \frac{1}{\pi} \approx 0.318 \text{ cycles/sec}$$

$$\#3. x(t) = -\frac{1}{4} \cos(\sqrt{96}t)$$

$$\#4. x(t) = \frac{1}{2} \cos(2t) + \frac{3}{4} \sin(2t)$$

$$\#5. (a) t = \frac{1}{4} \text{ sec}, (b) t = \frac{1}{2} \text{ sec}, (c) \frac{1}{e^2} \approx 0.1353 \text{ ft}$$

$$\#6. (a) x(t) = 5te^{-\sqrt{8}t}, (b) t = \frac{1}{\sqrt{8}} \approx 0.35355 \text{ sec}, (c) \frac{5}{\sqrt{8}} e^{-1} \approx 0.6503 \text{ ft}$$

$$\#7. (a) x(t) = \frac{4}{3} e^{-2t} - \frac{1}{3} e^{-8t}, (b) x(t) = -\frac{2}{3} e^{-2t} + \frac{5}{3} e^{-8t}$$

$$\#8. (a) x(t) = -e^{-2t} \cos(4t) - \frac{1}{2} e^{-2t} \sin(4t), (b) x(t) = e^{-2t} \left[ \frac{\sqrt{5}}{2} \sin(4t + 4.2487) \right], (c) t = 1.294 \text{ sec}$$

$$\#9. x(t) = -\frac{4}{3} e^{\frac{1}{2}t} \cos\left(\frac{\sqrt{47}}{2}t\right) - \frac{64}{3\sqrt{47}} e^{\frac{1}{2}t} \sin\left(\frac{\sqrt{47}}{2}t\right) + \frac{10}{3} \cos(3t) + \frac{10}{3} \sin(3t)$$

$$\#10. (a) q(t) = -10e^{-3t} \cos(3t) - 10e^{-3t} \sin(3t) + 10, (b) 10e^{-\pi} + 10 \approx 10.432 \text{ Coulombs}$$

$$\#11. (a) q_{\text{steady-state}}(t) = \frac{150}{13} \cos(t) + \frac{100}{13} \sin(t), (b) i_{\text{steady-state}}(t) = -\frac{150}{13} \sin(t) + \frac{100}{13} \cos(t)$$