

Elementary Engineering Mathematics

Exercises #7 Answers

1. a) $\omega \approx 28.6$ (rad/s)
b) decay rate, $\alpha \approx -1.82$
2. a) $x(t) \approx 0.633 \sin(15.8t) + 0.5 \cos(15.8t)$ (ft)
b) $x(t) \approx 0.806 \sin(15.8t + 0.669)$ (ft)
c) $t \approx 0.0570$ (sec)
d) $T \approx 0.4$ (sec)
3. a) $c_c \approx 12.7$ (system is under-damped)
b) $x(t) \approx e^{-3.75t} (0.773 \sin(15.4t) + 0.5 \cos(15.4t))$ (ft)
 $\approx 0.921 e^{-3.75t} \sin(15.4t + 0.574)$
4. a) $c_c \approx 12.7$ (system is over-damped)
b) $x(t) \approx 0.831 e^{-5.64t} - 0.331 e^{-44.4t}$ (ft)
5. a) $T \approx 0.02$ (sec)
b) $f \approx 50$ (Hz)
c) $\omega = 100\pi \approx 314$ (rad/s)
d) $A \approx 6$ (volts)
6. $i(t) \approx 5 \cos(120\pi t - 0.927)$ (amps)
7. $v(t) \approx 110 \cos(120\pi t + \frac{\pi}{6})$ (volts)