

ENGR 1990 Engineering Mathematics
Homework #9 Answers

1. a) $x(t) = 1.875e^{-6t} \sin(8t)$ (ft) and $v(t) = \dot{x}(t) = 18.75e^{-6t} \sin(8t + 2.214)$ (ft/s)
b) $a(t) = \dot{v}(t) = 187.5e^{-6t} \sin(8t + 4.429)$ (ft/s²)
c) $a(0) = -180$ (ft/s²)
d) displacement has local max/min when $\dot{x}(t) = 0$. This first occurs at $t = 0.116$ (sec).

2. a) $V(x) = 375 - 100x$ (lb) for $(0 \leq x \leq 5)$
 $V(x) = -125$ (lb) for $(5 \leq x \leq 10)$
b) $\hat{x} = 3.75$ (ft) and $M_{\max} = 703$ (ft-lb)

3. a) $v(t) = 0.125t^2(3 - 2t)e^{-2t}$
b) $v(t) = 0$ when $t = 0, \frac{3}{2}, \infty$ and $i(0) = 0$ and $i(\frac{3}{2}) = 0.168$ (amps)

4. $i(t) = -e^{-30t} [0.00792 \cos(120\pi t) + 0.0995 \sin(120\pi t)]$
 $= -0.0998e^{-30t} \cos(120\pi t - 1.49)$ (amps)