



$\frac{1}{2} \frac{d^2x}{dt^2} + \frac{1}{2} \frac{dx}{dt} + x = 0$
 The characteristic equation is
 $\frac{1}{2} s^2 + \frac{1}{2} s + 1 = 0$
 Multiplying by 2, we get
 $s^2 + s + 2 = 0$
 The roots are $s = -\frac{1}{2} \pm i\sqrt{3}$
 The general solution is
 $x(t) = e^{-\frac{1}{2}t} (C_1 \cos(\sqrt{3}t) + C_2 \sin(\sqrt{3}t))$

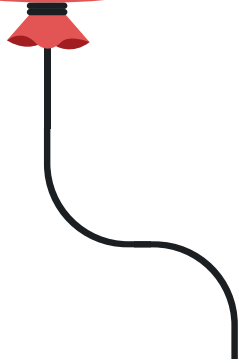
The initial conditions are $x(0) = 1$ and $\dot{x}(0) = 0$.
 At $t = 0$, $x(0) = C_1 = 1$.
 The derivative is $\dot{x}(t) = -\frac{1}{2} e^{-\frac{1}{2}t} (C_1 \cos(\sqrt{3}t) + C_2 \sin(\sqrt{3}t)) + e^{-\frac{1}{2}t} (-C_1 \sqrt{3} \sin(\sqrt{3}t) + C_2 \sqrt{3} \cos(\sqrt{3}t))$.
 At $t = 0$, $\dot{x}(0) = -\frac{1}{2} C_1 + \sqrt{3} C_2 = 0$.
 Since $C_1 = 1$, we have $-\frac{1}{2} + \sqrt{3} C_2 = 0$, so $C_2 = \frac{1}{2\sqrt{3}}$.
 The solution is $x(t) = e^{-\frac{1}{2}t} (\cos(\sqrt{3}t) + \frac{1}{2\sqrt{3}} \sin(\sqrt{3}t))$.

The amplitude of the oscillation is $\sqrt{1 + \frac{1}{12}} = \sqrt{\frac{13}{12}}$.
 The period of the oscillation is $\frac{2\pi}{\sqrt{3}}$.
 The time to reach the first maximum is $\frac{\pi}{\sqrt{3}}$.
 The time to reach the first minimum is $\frac{3\pi}{2\sqrt{3}} = \frac{\sqrt{3}\pi}{2}$.

The time to reach the first zero is $\frac{\pi}{2\sqrt{3}}$.
 The time to reach the first negative maximum is $\frac{5\pi}{6\sqrt{3}}$.
 The time to reach the first positive maximum is $\frac{7\pi}{6\sqrt{3}}$.
 The time to reach the first negative minimum is $\frac{9\pi}{6\sqrt{3}} = \frac{3\pi}{2\sqrt{3}}$.
 The time to reach the first positive minimum is $\frac{11\pi}{6\sqrt{3}}$.
 The time to reach the first zero is $\frac{13\pi}{6\sqrt{3}}$.

Inventory stress

The inventory stress is $I(t) = I_0 e^{-\lambda t}$.
 The initial inventory stress is I_0 .
 The decay constant is λ .
 The time to reach half the initial stress is $\frac{\ln 2}{\lambda}$.
 The time to reach one-tenth the initial stress is $\frac{\ln 10}{\lambda}$.



...the
... ..
... ..