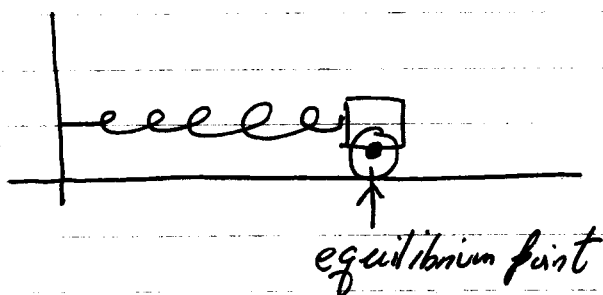
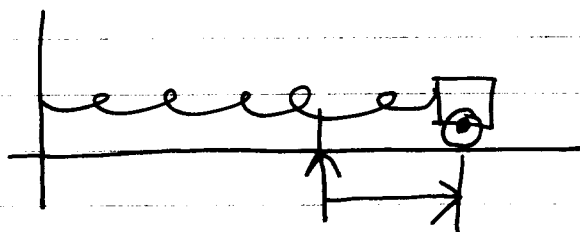


Mechanical Vibrations & The Spring-Mass Oscillator (See § 4.1)



a mass m is attached to a spring fixed at one end as shown.



Let $y(t)$ be the distance to the right at time t .

Hooke's Law: Spring exerts a force directly proportional to its displacement from the equilibrium position.

$$F_{\text{spring}} = -ky \quad (k > 0 \text{ constant: spring constant})$$

4.8 Free mechanical vibrations (No external force)

Log HW: 1, 3, 7, 9, 11.

UNDAMPED CASE

$$F = ma = -ky$$

$$my'' + ky = 0,$$

$$y'' + \frac{k}{m}y = 0$$

$$y'' + \omega^2 y = 0 \quad \text{where } \omega = \sqrt{k/m}.$$

A.E: $r^2 + \omega^2 = 0$
 $r^2 = -\omega^2$
 $r = \pm i\omega$