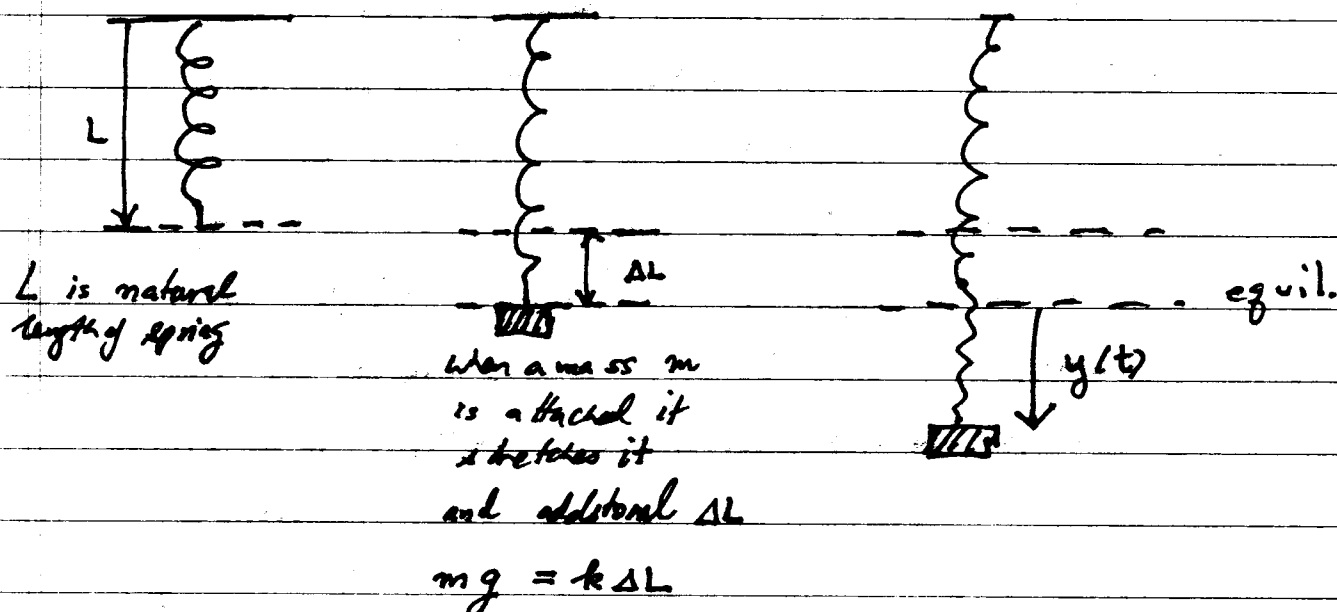


(41)
(2)

Wonging Vertically hanging spring mass system



Forces acting on mass:

- (1) $W = mg$
- (2) $F_{\text{spring}} = -k(y + \Delta L)$
- (3) $F_{\text{damping}} = -b \frac{dy}{dt}$
- (4) $F(t)$ external force

$$ma = W + F_{\text{spring}} + F_{\text{damping}} + F(t)$$

$$my'' = mg - k(y + \Delta L) - b \frac{dy}{dt} + F(t)$$

$$my'' = mg - ky - k\Delta L - b \frac{dy}{dt} + F(t)$$

$$my'' = mg - ky - mg - b \frac{dy}{dt} + F(t)$$

$$\boxed{my'' + by' + ky = F(t)}$$