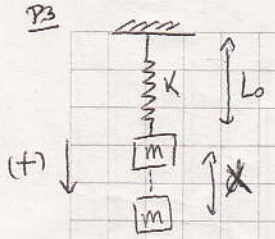
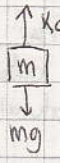
P3



dcl



$$mg - Kd = m\ddot{x}$$

$$0 = m\ddot{x} + Kx - mg$$

$$0 = \ddot{x} + \frac{K}{m}x - g$$

$$0 = \ddot{x} + \frac{K}{m}\left(x - \frac{mg}{K}\right)$$

$$z(t) = x(t) - \frac{mg}{K}$$

$$\dot{z} = \dot{x}$$

$$\ddot{z} = \ddot{x}$$

$$0 = \ddot{z} + \underbrace{\frac{K}{m}}_{\omega^2} z \qquad \omega^2 = \frac{K}{m}.$$

Sol: $z(t) = A\cos(\omega t + \phi)$ $\qquad \dot{z} = -A\omega\sin(\omega t + \phi)$

C.I $\quad z(0) = d$

$\dot{z}(0) = 0.$ $\qquad 0 = -A\omega\sin(\phi) \Rightarrow \phi = 0.$

$$z(t) = A\cos(\omega t)$$

$$z(0) = d = A\cos(0) \Rightarrow A = d$$

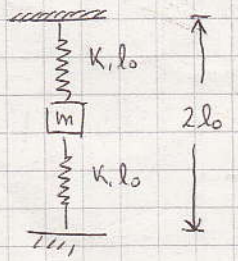
$$\Rightarrow \quad z(t) = d\cos(\omega t)$$

Volviendo a $x(t)$ $\Rightarrow$ $\quad x(t) = z(t) + \frac{mg}{K}$

$$\boxed{x(t) = d\cos(\omega t) + \frac{mg}{K}}$$

P4)

- oscilador armónico:

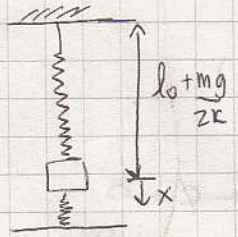


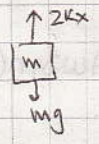
determine ec. de movim. para el MAS considerando que inicialm. ($t=0$) ambos resortes están en su largo natural y el bloque está en reposo.

sol: consideramos el pto de equilibrio con el bloque: baja una distancia X del pto de equilibrio

$$2Kx - mg = 0$$

$$\boxed{X = \frac{mg}{2K}}$$ nuevo pto de eq





$$2Kx - mg = +m\ddot{x}$$

$$\frac{2Kx}{m} - g = +\ddot{x}$$

$$0 = \ddot{x} + g - \frac{2Kx}{m}$$

$$0 = \ddot{x} + \frac{2K}{m}\left(\frac{gm}{2K} - x\right)$$

$$z = \frac{mg}{2K} - x$$

$$\dot{z} = -\dot{x}$$

$$\ddot{z} = -\ddot{x}$$

$$0 = -\ddot{z} + \frac{2K}{m} z$$

$$0 = \left(\ddot{z} - \frac{2K}{m} z\right) \cdot -1$$

$$\omega^2 = -\frac{2K}{m}$$

$$0 = \ddot{z} + \omega^2 z$$

$$z(t) = A\cos(\omega t + \phi)$$

$$\dot{z}(t) = -A\omega \sin(\omega t + \phi)$$

c.I: $z(t) = d$

$\dot{z}(0) = 0$.

$$0 = -A\omega \sin\phi \Rightarrow \phi = 0$$

$$d = A\cos(0) \Rightarrow A = d$$

$$z(t) = d\cos(\omega t)$$

$$\Rightarrow \boxed{X = \frac{mg}{2K} - d\cos(\omega t)} \quad //$$