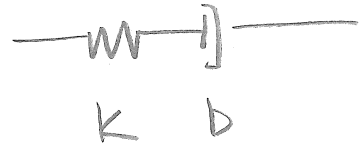
HMWK #1

BIOEN 520 | ME 527

#1.



$F_T = F_1 = F_2$

$x_T = x_1 + x_2$

$F_1 = K x_1 \quad F_2 = b \dot{x}_2$

$\dot{x}_T = \dot{x}_1 + \dot{x}_2$

$\dot{F}_1 = K \dot{x}_1$

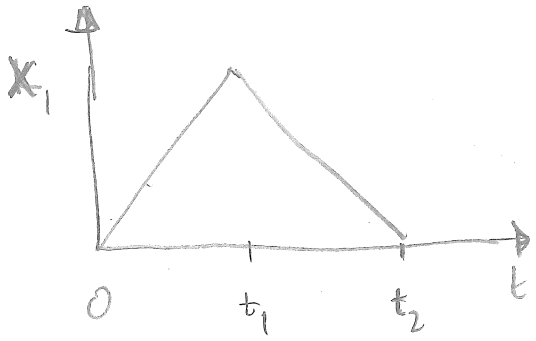
$\dot{x}_1 = \frac{\dot{F}_1}{K} \qquad \dot{x}_2 = \frac{F_2}{b}$

$\dot{x}_T = \frac{\dot{F}_1}{K} + \frac{F_2}{b}$

$kb \dot{x}_T = b \dot{F}_1 + K F_2$

$kb \dot{x} = b \dot{F} + K F$

#2



$F = Kx + b\dot{x}$

① $t = 0$

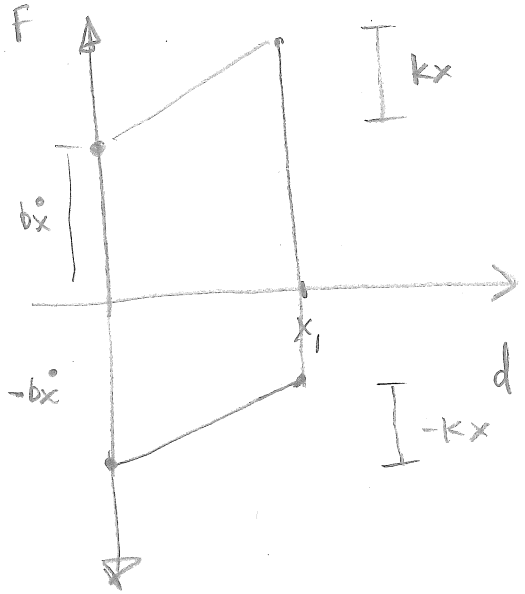
$F = 0$

① $t = 0^+$

$F = b\dot{x}$

① $t = t_1$

$F = Kx + b\dot{x}$



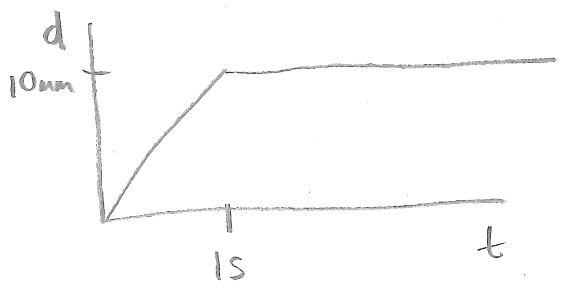
① $t = t_1^+$

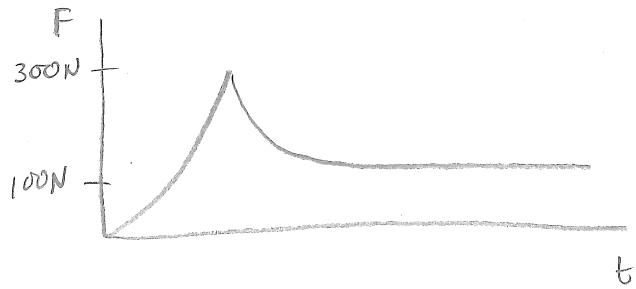
$F = Kx - b\dot{x}$

① $t = t_2$

$F = -b\dot{x}$

#3





SOLVE FIRST ↓

① $1s$ $F = Kx + bV$ ① $t = \infty$ $F = Kx$

$F = 10\frac{N}{mm}\ 10mm + b\ 10\frac{mm}{s}$ $100N = K\ 10mm$

$b = 20\ \frac{KNs}{m}$ $K = 10\ KN/m$