Homework D.6 - Solution

IV.6

a)   Collecting y's on LHS and F's on RHS and dividing by m gives

$$\ddot{\tilde{y}} + \frac{b}{m}\dot{\tilde{y}} + \frac{k}{m}\tilde{y} = \frac{1}{m}F$$

Taking the Laplace transform gives

$$\left[s^2 + \frac{b}{m}s + \frac{k}{m} \right]Y(s) = \frac{1}{m}F(s)$$

b)   Solving for $Y(s)$ gives

$$Y(s) = \left(\frac{\frac{1}{m}}{s^2 + \frac{b}{m}s + \frac{k}{m}} \right) F(s)$$

c) The block diagram is

$$F(s) \longrightarrow \boxed{\dfrac{1/m}{s^2 + \frac{b}{m}s + \frac{k}{m}}} \longrightarrow Y(s)$$