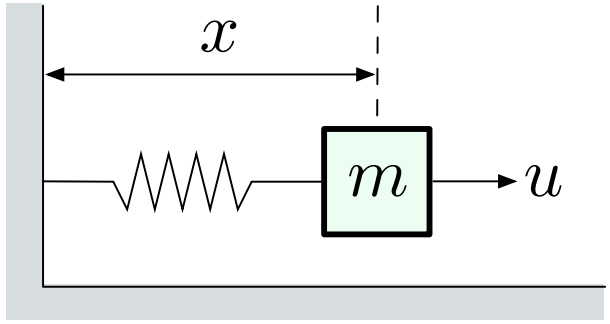
# Example 1: Mass-Spring System




State-space model: express in *matrix form*

$$\begin{pmatrix} \dot{x} \\ \dot{v} \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -\frac{k}{m} & -\frac{\rho}{m} \end{pmatrix} \begin{pmatrix} x \\ v \end{pmatrix} + \begin{pmatrix} 0 \\ \frac{1}{m} \end{pmatrix} u$$

**Important:** start reviewing your linear algebra ***now***!!

- matrix-vector multiplication; eigenvalues and eigenvectors; etc.