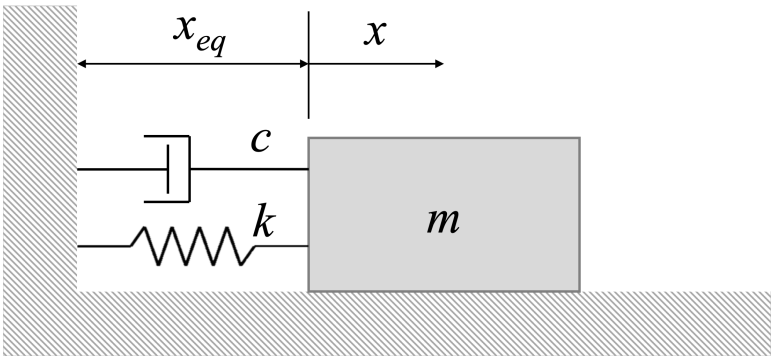
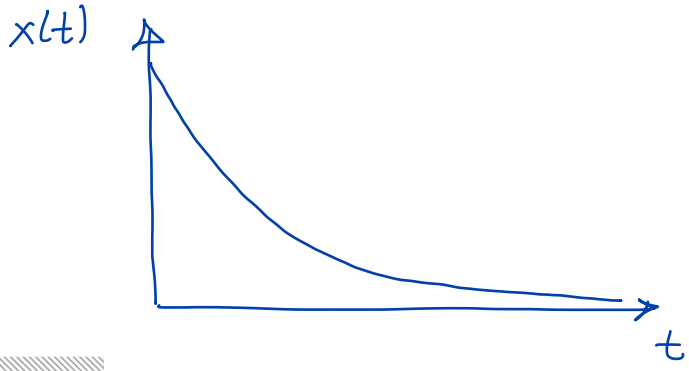
A 15 kg block on a frictionless surface is attached to a spring (k = 300 N/m). Find the damping constant, c, that will make the system critically damped.





critically damped

$c^2 = 4mk$

$= 4(15\,kg)(300\,N/m)$

$= 18{,}000\ \frac{N \cdot kg}{m}$

$c = 134.2\ \frac{kg}{s}$

units for c:

$\frac{N \cdot s}{m}$

$\frac{N \cdot kg}{m} = \frac{\left(\frac{kg\,m}{s^2}\right) \cdot kg}{m}$

$= \frac{kg^2}{s^2}$

$\Rightarrow \frac{kg}{s} = \frac{\left(\frac{N \cdot s^2}{m}\right)}{s} = \frac{N \cdot s}{m}$

$N = \frac{kg \cdot m}{s^2} \Rightarrow kg = \frac{N \cdot s^2}{m}$

$$\boxed{c = 134.2\ \frac{N \cdot s}{m}}$$