**P5.1-7)**[fe]   Consider the block of mass m resting on a level surface and attached to a spring with spring constant k. Derive the differential equation of motion for this block in terms the block's position x, where x is zero from the point that the spring is undeformed.   Consider that an external force F is being applied to the block in the direction shown and that the friction between the block and surface can be approximated by a viscous model that represents the friction force as proportional to the relative speed of the surfaces, $F_f = c\dot{x}$, and in a direction opposing the motion.

P5.1-7
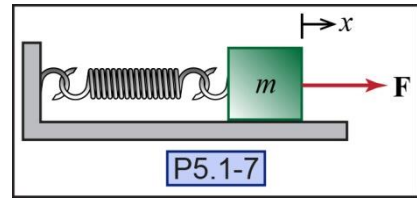
Given:

Find:

Solution:

FBD

Draw a free-body diagram of the block. Remember to include a coordinate system.

Equation of motion

Write down the equation of motion of the block in the x-direction.

Forces

Write down the force equation for the spring and friction.

$F_s = $ _____

$F_f = $ _____

Equation of motion:

_____