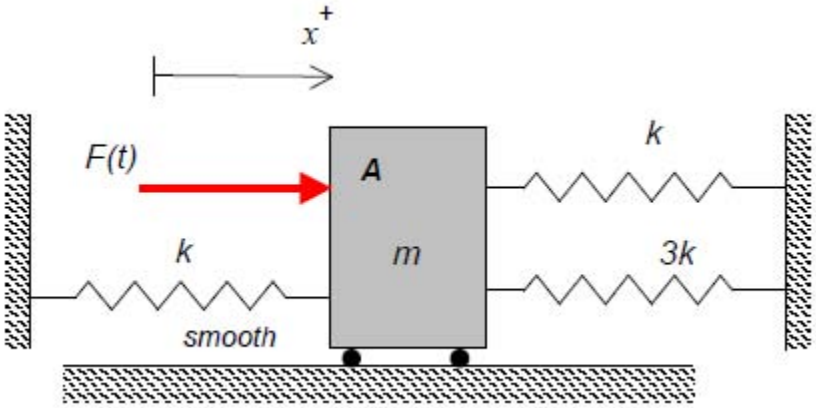
Homework H.6.I

Given: Block A, having a mass of m, is able to slide along a smooth horizontal surface. Three springs are connected between block A and ground, as shown in the figure below. A force $F(t) = F_0 \sin \omega t$ acts horizontally on block A. Let x represent the motion of block A measured positively to the right, and let $x = 0$ m designate the state at which the springs are unstretched.

Find: For this problem:
(a) Draw a free body diagram of block A;
(b) Derive the single differential equation of motion for the system in terms of the coordinate x; and
(c) Derive the particular solution $x_p(t)$ for the equation of motion derived above.



Use the following parameters in your analysis: $m = 10$ kg, $k = 3200$ N/m, $F_0 = 150$ N, and $\omega = 15$ rad/s.