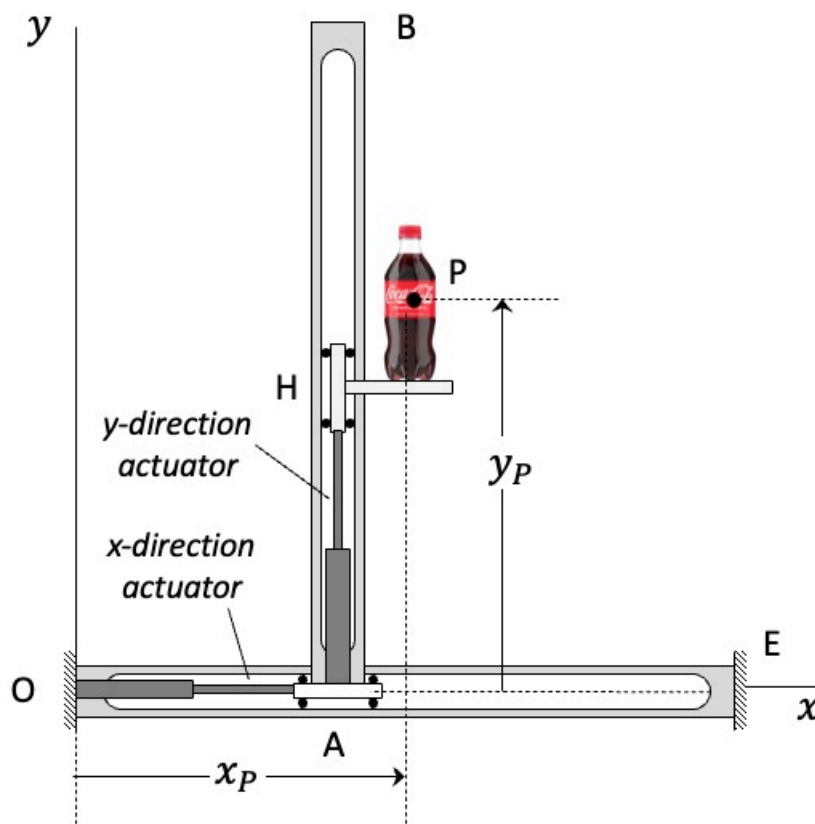


**Homework H1.A**

**Given:** A gantry-style vending machine is designed to deliver beverages to customers. The mechanism within this vending machine is made up of a vertical arm AB that is guided by a fixed horizontal slot OE, with this arm being positioned by a horizontally-oriented actuator OA. Within this vertical arm is a slot along which a beverage platform H is positioned by a vertically-oriented actuator AH. The actuators are set such that the  $x$  and  $y$  positions of point P on the beverage bottle are the following prescribed functions of time:  $x_P(t) = ht$  and  $y_P(t) = ce^{-bt}$ , where  $t$  is in seconds, and  $b$ ,  $c$  and  $h$  are constants.

**Find:**

- (a) Make a sketch of the path of P the  $xy$ -plane over the time range of  $0 < t < 4$ s.
- (b) Determine the velocity and acceleration vectors for P at  $t = 2$ s. Express these vectors in terms of their Cartesian coordinates.
- (c) Include these velocity and acceleration vectors in your sketch from above.



Use the following parameters in your work:  $b = 0.5/s$ ,  $c = 6$  ft,  $h = 1$  ft/s and  $t = 4$ s.