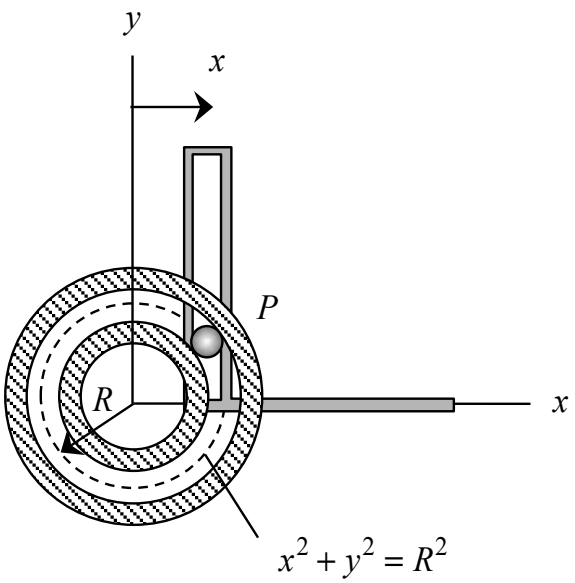
Homework H1.A

Given: Particle P is constrained to move along a fixed circular path of radius R, with the Cartesian components of locations on the circular path related by $x^2 + y^2 = R^2$, where x, y and R given in mm. In addition, P is also constrained to move within a vertical slot whose horizontal position is governed by $x = bsin\omega t$, where t is time in seconds.

Find: For the time $t = 0$:

(a) show the Cartesian unit vectors $\hat{i}$ and $\hat{j}$ in a sketch.

(b) determine the velocity $\vec{v}_P$ and acceleration $\vec{a}_P$ of P. Write your answers as vectors in terms of their Cartesian components. Include these vectors in your sketch.



Use the following parameters in your work: $R = 50$ mm, $b = 40$ mm and $\omega = 5\pi$ rad/s.