Homework H1.B

Given: Particle P moves along a path described in terms of Cartesian coordinates of $x = he^{bt}$ and $y = ce^{-bt}$ with x and y given in feet, and t is given in seconds.

Find: For this problem:

(a) show that the path taken by P is a hyperbola in the xy-plane.

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

(c) determine the velocity $\vec{v}_P$ and acceleration $\vec{a}_P$ of P at $t = 2$ s. Write your answers as vectors in terms of their Cartesian components. Include these vectors in your sketch.

Use the following parameters in your work: $b = 0.5/\text{s}$, $h = 1$ ft and $c = 16$ ft.