A spatially-uniform velocity field has a constant unit $x$ component, and a $y$ component varying in time as follows:

$$\vec{V}(t) = 1 \hat{i} + (1 - t) \hat{j}$$

a) Determine the pathline of a particle A emitted at the origin $x, y = (0, 0)$ at time $t = 0$. Determine the pathline of a particle B emitted at the origin $x, y = (1, 0)$ at time $t = 0$.

b) Sketch the pathlines on one plot. Will particles A and B collide?

c) Consider how a streakline emanating from $x, y = (0, 0)$, and starting at $t = 0$, develops in time for $t > 0$. Specifically, sketch this streakline as it appears at the four time snapshots $t = 1/2, t = 1, t = 3/2, t = 2$ (all on the same plot).