Consider the following “corner” flow, whose streamlines are shown in the figure below.

\[ u = y \quad v = x \]

a) A small square fluid element is placed at the point \( x, y = (0, 1) \) at time \( t = 0 \). This element then moves with the flow and possibly distorts. Determine the angles of the two sides \( \Delta \theta_1 \) and \( \Delta \theta_2 \) at some small \( \Delta t \) later, and sketch the new fluid element shape.

b) Repeat a), with the fluid element starting at the point \( x, y = (1, 1) \) at time \( t = 0 \).

c) Determine whether this flow is rotational or irrotational.

d) Determine whether this flow conserves mass. Assume the density \( \rho \) is constant. 

*This is a look-back to Fall Fluids lecture 6, or look-ahead to Spring Fluids lecture 3.*