Problem 114A

The velocity of a fluid, u_i, at a point, x_i, at time, t, is given by

$$u_i = \frac{x_i}{1 + a_i t}$$

where a_i is a set of positive constants.

1. Find the equations describing the streamlines and the particle paths.
2. Describe the particle paths and streamlines if $a_1 = 2$, $a_2 = 1$ and $a_3 = 0$.
3. If all $a_i = 1$, what can you say about the streamlines and particle paths?