Problem 117A

Consider the two equations of motion for planar flow of an incompressible, inviscid fluid under the action of conservative body forces. By eliminating the pressure from these two equations and using the continuity equation ($\partial u/\partial x + \partial v/\partial y = 0$) show that

$$\frac{\partial \omega}{\partial t} + u\frac{\partial \omega}{\partial x} + v\frac{\partial \omega}{\partial y} = 0$$

where ω is the vorticity ($\omega = \partial v/\partial x - \partial u/\partial y$). What can you conclude about the vorticity of a particular element of fluid in such a flow?