1. In Sutcliffe’s derivation of what we now know as the “Sutcliffe Development Theorem” we took the Laplacian of a set of term that involved the product of the column average geostrophic wind and the thermal wind. The following is an example of one of the terms in Sutcliffe’s derivation:

\[ \nabla^2 \left( \bar{u}_g \bar{v}_r \right) = \frac{\partial}{\partial x} \left[ \frac{\partial}{\partial x} \left( \bar{u}_g \bar{v}_r \right) \right] = \bar{u}_g \frac{\partial^2 v_r}{\partial^2 x} + 2 \frac{\partial u_g}{\partial x} \frac{\partial v_r}{\partial x} + v_r \frac{\partial^2 u_g}{\partial^2 x}. \]

Sutcliffe, however, assumed that he could neglect the collective group of terms that involved the product of derivatives in his derivation — these terms are called the deformation terms.

a. Identify the deformation term in the above expression.
b. Describe the characteristics of a flow that would lead to the deformation term being greater than 0.
c. Draw an example of the flow that you described in (b).