For flow around a sphere

$$v_r = -\frac{1}{2} U \cos\theta \left[2 - 3\left(\frac{a}{r}\right) + \left(\frac{a}{r}\right)^3 \right]$$

$$v_\theta = -\frac{1}{4} U \sin\theta \left[-4 + 3\left(\frac{a}{r}\right) + \left(\frac{a}{r}\right)^3 \right]$$

<u>estimate</u>

$$\rho(\underline{v}\cdot\nabla)\underline{v} \quad \text{and} \quad \mu\nabla^2\underline{v}$$

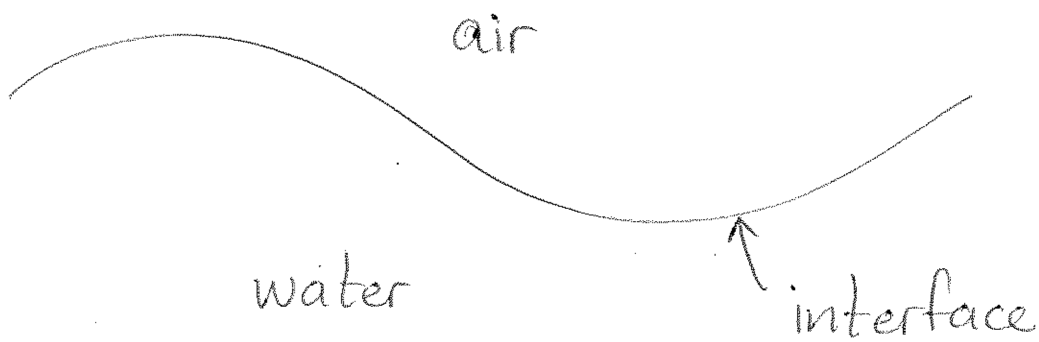
as $r \longrightarrow \infty$. Which of these is true?

a) $|\rho(\underline{v}\cdot\underline{\nabla})\underline{v}| \ll |\mu\nabla^2\underline{v}|$

b) $|\rho(\underline{v}\cdot\nabla)\underline{v}| \sim |\mu\nabla^2\underline{v}|$

c) $|\rho(\underline{v}\cdot\underline{\nabla})\underline{v}| \gg |\mu\nabla^2\underline{v}|$

Imagine a 2D <u>steady</u> flow with an interface



Is the interface a streamline?
(what does the velocity field look like for steady flow?)

a) yes

b) no