The two velocity potentials $\phi_1(x, y)$ and $\phi_2(x, y)$ are known to represent two physically-possible flows (i.e. satisfy mass conservation), and both have the same freestream velocity $V_\infty \hat{i}$, and the same freestream pressure $p_\infty$. Assuming a constant density, their corresponding pressure fields $p_1(x, y)$ and $p_2(x, y)$ are known via the Bernoulli equation.

A third flow is now defined by $\phi_3(x, y) = \phi_1 + 2\phi_2$, and is known to have the same freestream pressure $p_\infty$ as the other two flows.

a) What is this third flow's freestream velocity?

b) What is this flow's pressure field $p_3$?

c) Yet another flow $\phi_4 = \partial \phi_1 / \partial x$ is defined. What is its freestream velocity? Is this a physically-possible flow?