Start from Euler's equation

$$\frac{\partial v}{\partial t} + (v \cdot \nabla)v + \nabla p = 0 \text{ with } \mathrm{div} v = 0$$

Take the divergence to obtain Δp as a quadratic expression in $\frac{\partial v}{\partial x} = (\frac{\partial v_i}{\partial x_j})$. Use $\mathrm{div} v = 0$ to make this as simple as you can. Assuming v and p vanish sufficiently rapidly at ∞, express p itself in terms of v alone. In this case $\Delta p =$ whatever determines p only up to an additive harmonic function, then use the fact that $p(0) = 0$ to get rid of it.

Since this is an analysis problem, please be sure to be rigorous, and include as much detail as possible so that I can understand. Please also state if you are making use of some fact or theorem. Thanks!