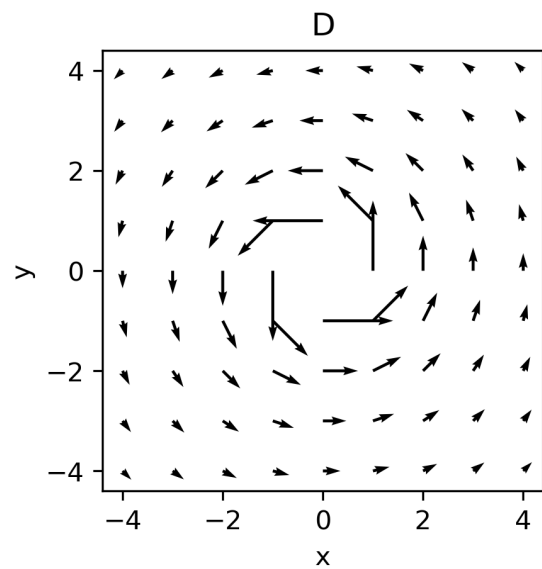# Exercise 3

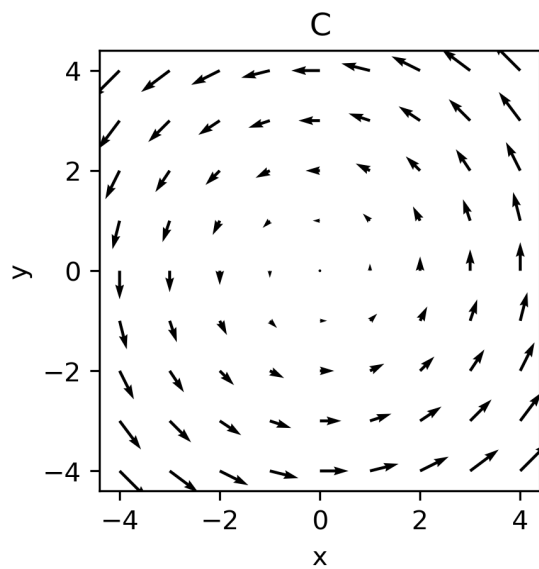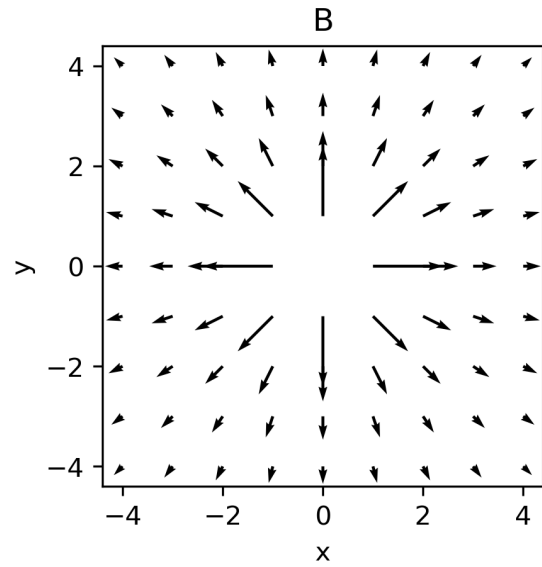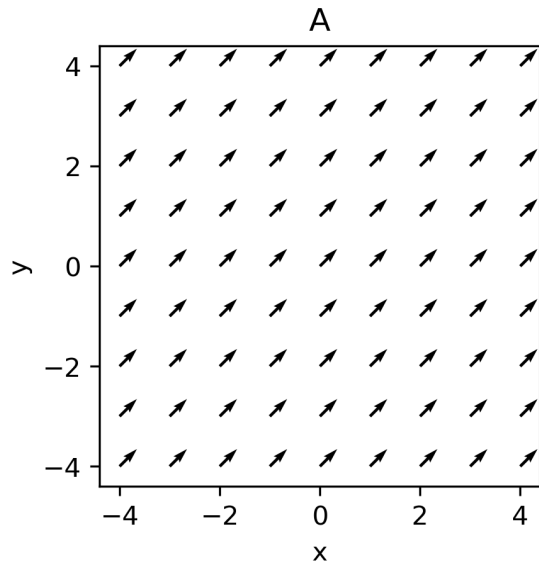## 1 Velocity decomposition

We infer on an expression for the flow field given by

$$v(x) = \begin{pmatrix} 1 - y \\ 1 + x \\ 0 \end{pmatrix} \tag{1}$$

1. Decompose the given velocity field by calculating the axial vector of spin tensor $\mathbf{W}$ and the strain rate tensor $\mathbf{D}$

2. Superposition of which **two** of the following flow fields would lead to the flow field as described in Equation 1.

☐ A	☐ B	☐ C	☐ D

2 Bernoulli

The figure shows a Venturi tube, which can be used to measure fluid flow. It comprises a cylindrical inlet with cross section A_1 followed by a convergent entrance into a cylindrical

throat with cross section A_2 and a divergent outlet. The velocity of the fluid at inlet and the throat is $\mathbf{v}_1$ and $\mathbf{v}_2$ respectively. The flowing fluid has density ρ_a and the liquid in the U-shaped tube has a density ρ_f.
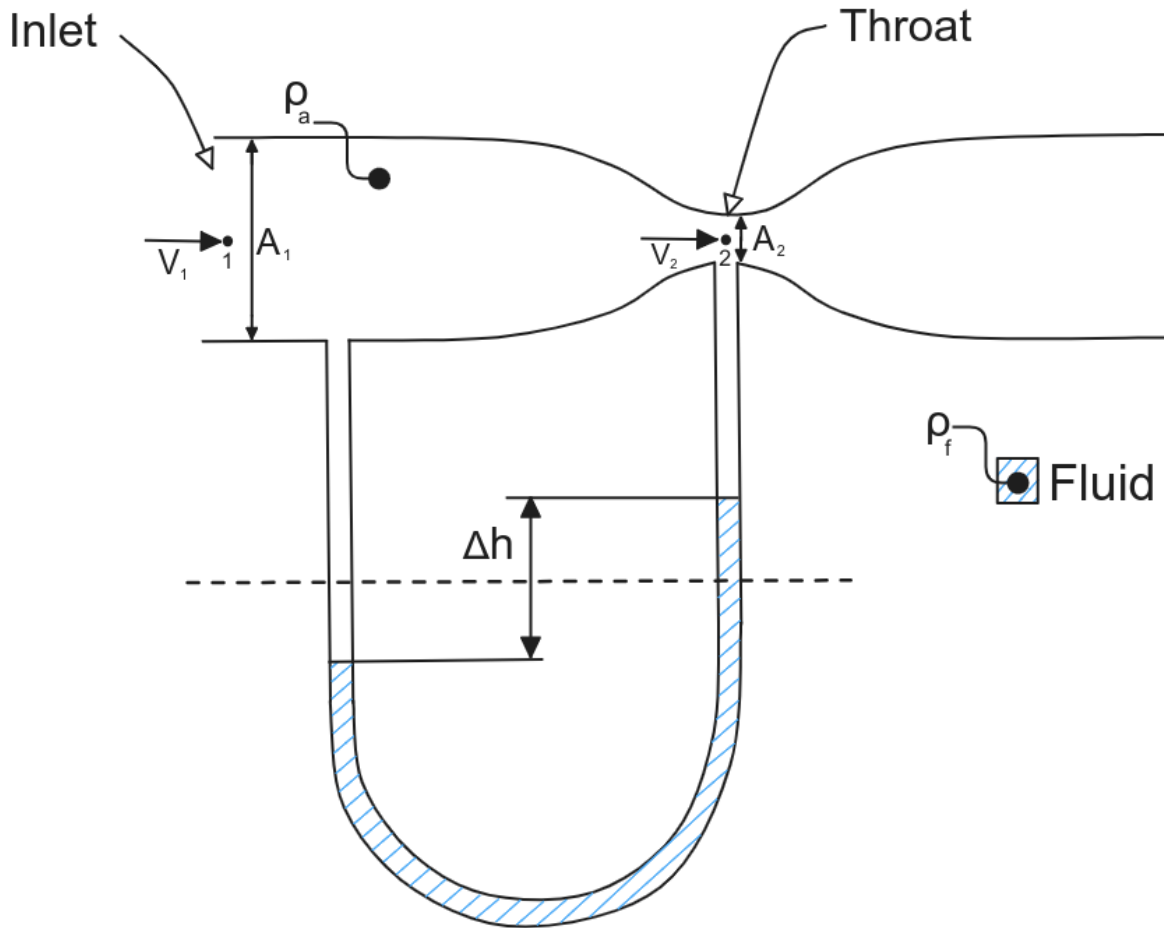
Tasks

Task 1

State the Bernoulli equation and explain to what fluid flow scenarios it can be applied.

Task 2

Calculate the velocity of the flowing fluid in terms of the difference in height of the fluid Δh in the U-shaped tube and other given quantities given in the figure.