**PHYS 426 – Week 2 Readings** **Kyle Argue, V00788941**

## Q1.

Will scan the sketch and put it up shortly.

If there is no friction and the channel is already flowing, it would take no energy to keep it moving.

If there is friction and the flow is at a steady state, there could be some pressure gradient exerting a force to counteract the friction. Examples could be gravity in a down sloping flow or a pressure exerted by a pump.

## Q2.

Sketch will be up shortly.

The dye will follow the flow's streamlines.

As the channel widens, the mass of the fluid is conserved between the dye streaks.

With no friction, the flow will still decelerate as there is a greater volume (wider channel) and since water is incompressible, in order to maintain the conservation of mass the flow must decelerate. Internal viscous forces are responsible.

## Q3.

Rate of work is power:

$$\boldsymbol{P} = \boldsymbol{F} \cdot \boldsymbol{u}$$

The drag force exerted on the cylinder, which has a radius $a$, is

$$\boldsymbol{F} = -\pi a^2 \rho \frac{d\boldsymbol{u}}{dt}$$