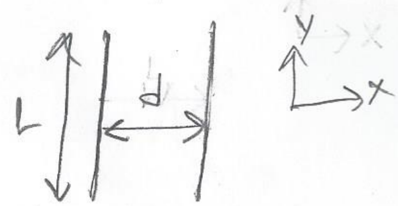
② $V_x = 0$

$V_y = f(x, \cancel{y}, \cancel{z})$

$V_z = 0$



a)

$$\rho\left[\cancel{\frac{\partial V_y}{\partial t}}^{0} + \cancel{V_x \frac{\partial V_x}{\partial x}}^{0} + \cancel{V_y \frac{\partial V_y}{\partial y}}^{0} + \cancel{V_z \frac{\partial V_y}{\partial z}}^{0}\right] = -\frac{\partial P}{\partial y} + \mu\left[\frac{\partial^2 V_y}{\partial x^2} + \cancel{\frac{\partial^2 V_y}{\partial y^2}}^{0} + \cancel{\frac{\partial^2 V_z}{\partial z^2}}^{0}\right] + \cancel{\rho g_y}^{0}$$

$$\mu \frac{\partial^2 V_y}{\partial x^2} - \frac{\partial P}{\partial y} = 0$$

BC

$V_y(x=0) = 0$

$V_y(x=d) = 0$

$$\frac{\partial^2 V_y}{\partial x^2} - \frac{1}{\mu}\frac{\partial P}{\partial y} = 0$$

$$\frac{\partial^2 V_y}{\partial x^2} = \frac{1}{\mu}\frac{\partial P}{\partial y}$$

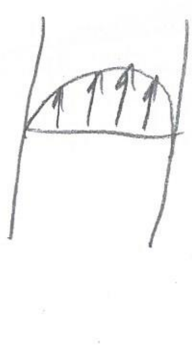
$$\frac{\partial V_y}{\partial x} = \frac{1}{\mu}\frac{\partial P}{\partial y}x + C_1$$

$$V_y = \frac{1}{2\mu}\frac{\partial P}{\partial y}x^2 + C_1 x + C_2 \qquad V_y^{x=0} = 0 + 0 + C_2$$

$$\Rightarrow C_2 = 0$$

$$0 = \frac{1}{2\mu}\frac{\partial P}{\partial y}d^{\cancel{2}} + C_1 \cancel{d} \qquad C_1 = -\frac{d}{2\mu}\frac{\partial P}{\partial y}$$

$$V_y = \frac{1}{2\mu}\frac{\partial P}{\partial y}x^2 - \frac{d}{2\mu}\frac{\partial P}{\partial y}$$



$$\boxed{V_y = \frac{1}{2\mu}\frac{\partial P}{\partial y}\left[x^2 - d\right]}$$