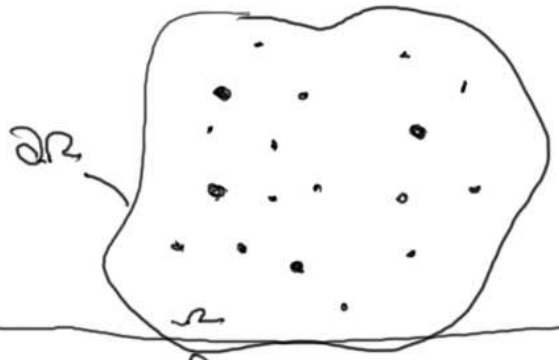
$$\frac{\partial p}{\partial t} = \alpha \nabla \cdot (\nabla p)$$

$$\int_\Omega w(\vec{x}) \frac{\partial p(\vec{x},t)}{\partial t} - w(\vec{x}) \alpha \nabla \cdot (\nabla p(\vec{x},t)) d\vec{x} = 0$$



$$\int_\Omega w(\vec{x}) \frac{\partial p(\vec{x},t)}{\partial t} d\vec{x} + \alpha \int_\Omega \nabla w(\vec{x}) \nabla p(\vec{x},t) d\vec{x} + \alpha \int_{\partial\Omega} w(\vec{x}) \nabla p(\vec{x},t) d\vec{x} = 0$$

Weak Form

↓ 1D

$$\int_0^L w(x) \frac{\partial p(x,t)}{\partial t} dx + \alpha \int_0^L \frac{\partial w(x)}{\partial x} \frac{\partial p(x,t)}{\partial x} dx + \alpha \left[w(x) \frac{\partial p(x,t)}{\partial x} \right]_0^L$$