ODE ✓ → PDE $2D$ 1^{st} ORDINE

→ "PDE" 2^{nd} ORDINE

$1D$

$$\partial_{xx} u + \partial_{yy} u = 0$$

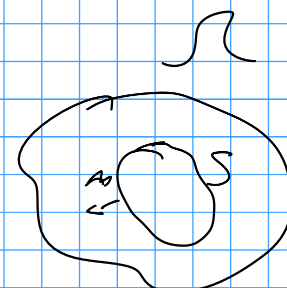
- $\Omega \subset \mathbb{R}^d$ $\quad d \geq 1 \quad u : \Omega \to \mathbb{R}$

$$-\Delta u = f \quad \text{in } \Omega \qquad \text{EQ. DI POISSON}$$

$$\partial^2_{x_1} u + \partial^2_{x_2} u + \dots + \partial^2_{x_d} u = f$$

- se $f = 0$ ⇒ OMOGENEA → EQ. DI LAPLACE

- $$\int_{\partial S} F \cdot n \, d\Gamma = 0$$



$S \subset \Omega$

→ GAUSS-GREEN

$$\int_S \operatorname{div} F \, dx = \int_{\partial S} F \cdot n \, d\Gamma$$

→ $\operatorname{div}(F) = 0$ in Ω

↳ u → $F = -a \nabla u \qquad a \in \mathbb{R} \quad a > 0$

$$\operatorname{div}(-a \nabla u) = 0 = -a \Delta u = 0$$

$$\operatorname{div}(\nabla u) = \operatorname{div}\begin{pmatrix} \partial_{x_1} u \\ \vdots \\ \partial_{x_d} u \end{pmatrix} = \partial_{x_1}\partial_{x_1} u + \dots \partial_{x_d}\partial_{x_d} u = \Delta u.$$