

# Równanie Przepływu Ciepła

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$$-k(x) \frac{d^2 u(x)}{dx^2} = 0$$

$$u(2) = 0$$

$$\frac{du(0)}{dx} + u(0) = 20$$

$$k(x) = \begin{cases} 1 & \text{dla } x \in [0, 1] \\ 2 & \text{dla } x \in (1, 2] \end{cases}$$

Gdzie  $u$  to poszukiwana funkcja

$$[0, 2] \ni x \rightarrow u(x) \in \mathbb{R}$$

$$-k \cdot u'' = 0 \quad / : k \quad (k \neq 0)$$

$$u'' = 0 \quad / \cdot \int_0^2 v dx$$

$$\int_0^2 u'' v dx = \left[ \begin{matrix} v \\ u'' \end{matrix} \right]_0^2 = v u' \Big|_0^2 - \int_0^2 u' v' dx = \underbrace{v(2) u'(2)}_{0} - \underbrace{v(0) u'(0)}_{v(0) \cdot (20 - u(0))} - \int_0^2 u' v' dx =$$

$$- 20 v(0) + u(0) v(0) - \int_0^2 u' v' dx = 0$$

$$\underbrace{u(0) v(0)}_{B(u, v)} - \int_0^2 u' v' dx = \underbrace{20 v(0)}_{L(v)}$$