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

$$u(2) = 0 \qquad (\boldsymbol{II})$$

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

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

$$-ku'' = 0$$

$$-u'' = 0$$

$$v \leftarrow funkcja\ testująca,\ \ D_v\colon x \in [0,2],\ \ gdzie\ v(2) = 0\ \big(wynika\ z\ (\boldsymbol{II})\big) \quad (\boldsymbol{V})$$

$$\int_0^2 u''v\,dx = 0$$

$$vu'\Big|_0^2 + \int_0^2 u'v'\,dx = 0$$

$$v(2)u'(2) - v(0)u' - \int_0^2 u'v'\,dx = 0 \qquad (\boldsymbol{A})$$

$$z\ (\boldsymbol{V})\ wynika,\ \ że\colon\ \ v(0)u'(0) = 0$$

$$z\ (\boldsymbol{III})\ wynika,\ \ że\colon\ \ u'(0) = 20 - u(0)$$

$$wracając\ do\ równania\ (\boldsymbol{A})\colon$$

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

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

$$B(u,v) = v(0)u(0) - \int_0^2 u'v'\,dx$$

$$L(v) = 20v(0)$$