$$-\frac{d}{dx}\left(E(x)\frac{du(x)}{dx}\right)=0 \qquad E(x)=\begin{cases}3, & x\in[0,1]\\ 5, & x\in(1,2]\end{cases}$$

$$u(2)=0 \qquad \frac{du(0)}{dx}+u(0)=10 \qquad [0,2]\ni x\to u(x)\in\mathbb{R}$$

$$u'(0)=10-u(0)$$

$$-(E(x)u')'=0 \;/\int_0^2 v\,dx \,, \quad v(2)=0 \quad (u(2)=0)$$

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

$$-\left[E(x)u'v\right]_0^2+\int_0^2 E(x)u'v'dx=0$$

$$-\underbrace{E(2)u'(2)v(2)}_{0}+E(0)u'(0)v(0)+\int_0^2 E(x)u'v'dx=0$$

($E(2)=5$, $v(2)=0$, $E(0)=3$, $u'(0)=10-u(0)$)

$$3(10-u(0))v(0)+\int_0^2 E(x)u'v'dx=0$$

$$30v(0)-3u(0)v(0)+\int_0^2 E(x)u'v'dx=0$$

$$\underbrace{\int_0^2 E(x)u'v'dx-3u(0)v(0)}_{B(u,v)}=\underbrace{-30v(0)}_{L(v)}$$