Example. Let $u(x, t)$ solve the heat flow problem

$$u_t = u_{xx}, \quad 0 < x < 1, \quad t > 0$$

with nonhomogeneous BC.s $u(0, t) = 1$ and $u(1, t) = 3$, and with the initial condition $u(x, 0) = 0$.

(a) Determine the steady state solution $w(x)$.

(b) Let $u(x, t) = w(x) + v(x, t)$, and use the method of separation of variables to determine $v(x, t)$. 

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