$\lambda > 0$ $X''(x) = \lambda X(x)$ ① $T''(t) = \lambda T(t)$ ③

$$\Longrightarrow X(x) = c_1 e^{\sqrt{\lambda}x} + c_2 e^{-\sqrt{\lambda}x}$$
$$T(t) = D_1 e^{\sqrt{\lambda}t} + D_2 e^{-\sqrt{\lambda}t} \quad 0{,}2$$

$$(4) \Rightarrow y(0,t) = (c_1 + c_2)T(t) = 0 \quad \forall t > 0$$

$$\Longrightarrow c_1 + c_2 = 0 \Longrightarrow c_1 = -c_2 = c \quad 0{,}2$$

además: $y(1,t) = c_1(e^{\sqrt{\lambda}} - e^{-\sqrt{\lambda}})T(t) = 0 \quad \forall t > 0$

$$\Longrightarrow e^{\sqrt{\lambda}} = e^{-\sqrt{\lambda}} \Longleftrightarrow e^{2\sqrt{\lambda}} = 1 \quad (\lambda < 0)$$

$$\Longrightarrow e^{2\sqrt{\lambda}} = e^{2n\pi i} = \cos(\cancel{2n\pi i})^{1} + i\,\cancel{\operatorname{sen}(2n\pi i)}^{0}$$
$$\Longrightarrow \cancel{2}\sqrt{\lambda} = \cancel{2}n\pi i$$
$$\Longrightarrow \lambda_n = -\pi^2 n^2 \quad \text{con } n \in \mathbb{N} \quad 0{,}3$$

Luego $X_n(x) = C_n[(\cos(n\pi x) + i\operatorname{sen}(n\pi x)) - (\cos(n\pi x) - i\operatorname{sen}(n\pi x))]$

$$\Longrightarrow X_n(x) = 2i\, C_n \operatorname{sen}(n\pi x) \quad 0{,}2$$

Para T se tiene:

$$\frac{dy}{dt}(x,0) = 0 \Longrightarrow \frac{dT}{dt}(0) \cdot X(x) = 0 \quad \forall x \in [0, L]$$

$$\Longrightarrow \frac{dT(0)}{dt} = 0 \Longrightarrow D_1 - D_2 = 0$$
$$\Longrightarrow D_1 = D_2 = D$$

Luego, en forma análoga al calculo anterior se obtiene:

$$T_n(t) = 2D_n \cos(n\pi t) \quad 0{,}5$$

OJO QUE $n \geq 1$ para soluciones no triviales (aunque daría lo mismo PERO sumaríamos cERO)

1,5 ptos