

# PS7

Mary Ann Odete

October 2017

## 1 Separation of Variables

$$u(x, t) = v(x)w(t)$$

$$\frac{d}{dt}v(x)w(t) = \alpha \frac{d^2}{dx^2}v(x)w(t)$$

$$v(x) \frac{d}{dt}w(t) = \alpha w(t) \frac{d^2}{dx^2}v(x)$$

$$\alpha = \frac{v(x)}{w(t)} \frac{\frac{d}{dt}w(t)}{\frac{d^2}{dx^2}v(x)}$$

$$\begin{aligned} \frac{1}{w(t)} \frac{d}{dt}w(t) &= \frac{\alpha}{v(x)} \frac{d^2}{dx^2}v(x) \\ &= \lambda w(t) \end{aligned}$$