Exercise:

(a) Find the Fourier transform of

$$f(x) = \begin{cases} e^{-2x} & , \ x > 0 \\ 0 & , \ x < 0 \end{cases}$$

(b) Use the Fourier transform to solve

$$\begin{cases} \frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} & , \ -\infty < x < \infty \ , \ t > 0 \\ u(x, 0) = f(x) & , \ -\infty < x < \infty \end{cases}$$

where f is defined in (a).