MATH4220 PDE
Quiz 2 (10 points)
April 10, 2018

1. (7 points) Consider the eigenvalue problem

$$\begin{cases} -X'' = \lambda X, & 0 < x < \pi \\ X'(0) = 0, & X(\pi) = 0 \end{cases}$$

   (i) Can the eigenvalue problem have complex eigenvalue? Why?

   (ii) Can the eigenvalue problem have non-positive eigenvalue? Why?

   (iii) Solve the eigenvalue problem.

2. (3 points) Solve the following problem

$$\begin{cases} \partial_t^2 u = \partial_x^2 u, & 0 < x < \pi, & t \geq 0 \\ \partial_x u(0,t) = \partial_x u(\pi,t) = 0 & & \\ u(x,t=0) = 0, & \partial_t u(x,t=0) = \cos^2 x, & 0 < x < \pi \end{cases}$$