# MATH4220 PDE
# Quiz 2 (10 points)
# April 6, 2017

1. (3 points) Can the eigenvalue problem

$$\begin{array}{ll} -X''(x) = \lambda X(x), & 0 < x < 1 \\ X(0) = 0, & X'(1) = 0 \end{array}$$

have nonpositive eigenvalues? Prove your statement.

2. (3 points) Find the Fourier sine series of $f(x) = x$ on $(0, \pi)$. Then find the sum $\sum_{n=1}^{\infty} \frac{1}{n^2}$ by using Parseval's identity.

3. (4 points) Solve the following problem

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