Math 404, Fall 2020
Homework #3

These problem are worth 6 points each.

1. Textbook, page 56, problem #1 (but I have changed the initial condition from $u(x,0) = x$ to $u(x,0) = 1$ to make solving it a little easier.

$$\begin{aligned} &u_t = u_{xx} && 0 < x < 1, \quad t > 1 \\ &u(0,t) = 0 && t > 0 \\ &u_x(1,t) = 0 && t > 0 \\ &u(x,0) = 1 && 0 < x < 1 \end{aligned}$$

2. Textbook, page 57, problem #3:

$$\begin{aligned} &u_t = u_{xx} && 0 < x < 1, \quad t > 1 \\ &u_x(0,t) = 0 && t > 0 \\ &u_x(1,t) = 0 && t > 0 \\ &u(x,0) = x && 0 < x < 1 \end{aligned}$$

3. Solve the initial/boundary value problem (24) on Slide #44:

$$\begin{aligned} &\frac{\partial u}{\partial t} = \kappa \frac{\partial^2 u}{\partial x^2} && 0 < x < L, \quad t > 0 \\ &u(0,t) = 0 && t > 0 \\ &u(L,t) = \sigma \sin \omega t && t > 0 \\ &u(x,0) = 0 && 0 < x < L \end{aligned}$$