MATH 256-201

Tutorial 11 Worksheet

March 27, 2017

Surname: _____ Given name: _____

Student number: _____

1. Solve the following 1D heat equation defined on the interval $0 \leq x \leq 2$, and having the initial condition $u(x, 0) = x$ for $0 \leq x \leq 2$.

$$\begin{cases} u_t = 4u_{xx} \\ u(0, t) = 0 \\ u(2, t) = 0 \end{cases}$$

(Turn over for Problem 2 & 3)

2. Solve the following 1D heat equation defined on the interval $0 \leq x \leq 2$, and having the initial condition $u(x,0) = x + 1$ for $0 \leq x \leq 2$.

$$\begin{cases} u_t = 4u_{xx} \\ u(0,t) = 1 \\ u(2,t) = 5 \end{cases}$$

3. What family of trig function should you use in order to solve the following 1D heat equation defined on the interval $0 \leq x \leq 2$, and having the initial condition $u(x,0) = x$ for $0 \leq x \leq 2$? Specify the function, $\sin(\omega x)$ or $\cos(\omega x)$, and the spatial frequencies ω as a function of an integer n.

$$\begin{cases} u_t = 4u_{xx} \\ u(0,t) = 0 \\ u_x(2,t) = 0 \end{cases}$$