Sec. 2.2 7

The steady state solution satisfies

$$\frac{\partial^2 u}{\partial x^2} = 0$$

and

$$\frac{\partial u}{\partial t} = 0$$

Therefore it is of the form

$$u(x,t) = ax^2 + bx + c$$

The boundary condition imlies that

$$u(x,t) = T_0 + arx - \frac{r}{2}x^2$$

Sec 2.3 5

We know that the solution is of the form

$$w(x,t) = \sum_{n=1}^{\infty} b_n \sin(\frac{n\pi x}{a}) \exp(\frac{-n^2\pi^2 kt}{a^2})$$

The intial condition says

$$w(x,0) = T_0$$

So

$$b_n = \frac{2}{a}\int_0^a T_0 \sin(\frac{n\pi x}{a}) dx \tag{1}$$

$$= T_0 \frac{2(1-\cos(n\pi))}{n\pi} \tag{2}$$