Math 333 Homework Problems #6

APPLIED PARTIAL DIFFERENTIAL EQUATIONS ... (4TH EDITION), by R. Haberman

3. FOURIER SERIES

3.4. *Term-by-term differentiation of Fourier series*

- 3.4.12, 3.4.13
- 3.4.14 Consider the heat equation

$$\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2} + q(x,t); \qquad \frac{\partial u}{\partial x}(0,t) = \frac{\partial u}{\partial x}(L,t) = 0, \quad u(x,0) = f(x).$$

Assuming that $q(x,t)$ is a piecewise smooth function of x for each $t \geq 0$, solve the problem. If

$$q(x,t) := Q(x), \quad \int_0^L Q(x)\,\mathrm{d}x = 0,$$

determine $\lim_{t\to+\infty} u(x,t)$.

3.5. *Term-by-term integration of Fourier series*

- 3.5.1, 3.5.2