HW3

February 5, 2012

1. Book questions: 2.3.1, 2.3.2(b)(c),2.3.3(a)
2. If

$$f(x) = A_0 + \sum_{n=1}^{\infty} A_n \cos(\frac{n\pi x}{L}),$$

show that

$$A_0 = \frac{1}{L}\int_0^L f(x)dx,$$

and

$$A_n = \frac{2}{L}\int_0^L f(x)\cos(\frac{n\pi x}{L})dx, n = 1, 2, 3...$$

by proving that

$$\int_0^L \cos(\frac{n\pi x}{L})\cos(\frac{m\pi x}{L})dx = \begin{cases} 0 & \text{if} \quad n \neq m, \\ \frac{L}{2} & \text{if} \quad n = m \neq 0, \\ L & \text{if} \quad n = m = 0, \end{cases}$$

first.