

# MST 352/652

## Homework #6

Due Date: February 27, 2019

### 1 Problems for everyone

1. pg. 81-82, #3.2.14, #3.2.15, #3.2.17, #3.2.20.
2. pg. 87-88, #3.2.31-#3.2.35, #3.2.40.
3. pg. 95, #3.3.1-3.3.4.
4. pg. 97, #3.4.3.
5. pg. 138-140, #4.1.7-4.1.9, #4.1.12-4.1.15

### 2 Graduate Problems

1. Find the Fourier series of the function  $|\sin(x)|$  in the interval  $(-\pi, \pi)$ . Use it to find the following sums:

$$\sum_{n=1}^{\infty} \frac{1}{4n^2 - 1} \text{ and } \sum_{n=1}^{\infty} \frac{(-1)^n}{4n^2 - 1}.$$

2. Let  $\phi(x) = x$ .
  - (a) Find the Fourier series of  $\phi(x)$  on  $(0, l)$ .
  - (b) Integrating term by term, find the Fourier series of  $x^2/2$  on  $(0, l)$ . Be careful about calculating the  $a_0$  term.
  - (c) Find the sum of the following series:

$$\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{n^2}.$$

- (d) Find the Fourier series of  $x^3$  and  $x^4$  on the interval  $(0, l)$ .
- (e) Find the sum of the following series:

$$\sum_{n=1}^{\infty} \frac{(-1)^n}{n^4}.$$

3. pg. 139, #4.1.16-4.1.18.