

Math 21B, Fall 2020  
October 7, 2020

## **HOMEWORK 1**

Due: 10/14/2020 at 17:00

This homework has 2 pages, but you have to solve 15 problems in total. After the due, only 3 problems will be randomly selected and graded.

The instructions are:

- Students in Section B: Solve all problems from PART I, but NOT the additional problems in PART II.
- Students in Section 0U1: Solve all problems (including the ones in PART II), except problems [1](#), [2](#) and [3](#) from PART I.

### **PART I: FROM SCANNED PROBLEMS (at our website)**

1. [5.2.35](#)
2. [5.3.10](#)
3. [5.4.78](#)
4. 4.8.42
5. 4.8.84
6. 5.1.7
7. 5.2.10
8. 5.2.18
9. 5.2.30
10. 5.2.41
11. 5.2.46
12. 5.3.22
13. 5.3.26
14. 5.3.54
15. 5.3.80

## Theory and Examples

1. a. If  $\int_0^1 7f(x) dx = 7$ , does  $\int_0^1 f(x) dx = 1$ ?

b. If  $\int_0^1 f(x) dx = 4$  and  $f(x) \geq 0$ , does

$$\int_0^1 \sqrt{f(x)} dx = \sqrt{4} = 2?$$

Give reasons for your answers.

2. Suppose  $\int_{-2}^2 f(x) dx = 4$ ,  $\int_2^5 f(x) dx = 3$ ,  $\int_{-2}^5 g(x) dx = 2$ .

Which, if any, of the following statements are true?

a.  $\int_5^2 f(x) dx = -3$

b.  $\int_{-2}^5 (f(x) + g(x)) dx = 9$

c.  $f(x) \leq g(x)$  on the interval  $-2 \leq x \leq 5$

3. **Initial value problem** Show that

$$y = \frac{1}{a} \int_0^x f(t) \sin a(x - t) dt$$

solves the initial value problem

$$\frac{d^2y}{dx^2} + a^2y = f(x), \quad \frac{dy}{dx} = 0 \text{ and } y = 0 \text{ when } x = 0.$$

(Hint:  $\sin(ax - at) = \sin ax \cos at - \cos ax \sin at$ .)