

# MAT320 Problem Set 6

Due Nov 2, 2023

Please write your homework on paper neatly or type it up in LaTeX, and hand it in at the beginning of class next Thursday.

Royden  $X.Y.Z$  refers Problem  $Z$  in Royden-Fitzpatrick, found in the collection of problems at the end of section  $X.Y$ .

**Problem 1.** Royden 3.1.1.

**Problem 2.** Royden 4.1.2

**Problem 3.** Royden 4.1.5.

**Problem 4.** Royden 4.1.8.

**Problem 5.** Given an example (with proof) of a sequence of nonnegative measurable functions  $f_n : [0, 1] \rightarrow \mathbb{R}$  such that  $f_n \rightarrow f$  pointwise almost everywhere on  $[0, 1]$  and

$$\lim_{n \rightarrow \infty} \int_0^1 f_n > \int_0^1 f.$$

(note the *strict inequality*.) You may use that piecewise continuous functions are Riemann integrable.

**Extra credit.** Royden 3.2.21.