

# MAT 319/320: Basics of Analysis, Spring 2019

## Homework Assignment 4

Please read Sections 11 and 12 of Ross's textbook thoroughly.

*Optional supplemental reading for MAT 320: Rudin's book, pp55-58*

Problem Set 4 (due before the start of recitation on Wednesday, February 27th):

11.3, 11.8, 11.9, 11.10, 12.2, 12.3, 12.6, 12.13, and Problem B\* below

\*Problem B *must* be answered on a printout of this sheet

### Problem B

Find a sequence whose set of subsequential limits is equal to each of the following, or state why this is impossible. You may find Example 11.3 in the book helpful, and you may refer to the sequence  $r_n$  described there in your answers.

- (a) The open interval  $(0, 1)$ .
- (b) The set  $\mathbb{Z}_{>0} \cup \{+\infty\}$  of positive integers with  $+\infty$ .
- (c) The set  $\mathbb{Z}_{>0}$  of positive integers.
- (d) The set  $\mathbb{Z} \cup \{-\infty, +\infty\}$  of integers with  $-\infty$  and  $+\infty$ .
- (e) The set  $\mathbb{Q} \cap [0, 1]$  of rationals in the interval  $[0, 1]$ .
- (f) The set  $\mathbb{R}_{\geq 0} \cup \{+\infty\}$  of nonnegative real numbers with  $+\infty$ .
- (g) The set  $\mathbb{R}_{\geq 0} \cup \{-\infty, +\infty\}$  of nonnegative real numbers with  $-\infty$  and  $+\infty$ .
- (h) The set  $\{-\infty, +\infty\} \cup \bigcup_{n=-\infty}^{\infty} [2n, 2n + 1]$ . This is the union of  $\{-\infty, +\infty\}$  with  
 $\dots \cup [-6, -5] \cup [-4, -3] \cup [-2, -1] \cup [0, 1] \cup [2, 3] \cup [4, 5] \cup \dots$ .
- (i) The empty set  $\emptyset$ .