

Math 401/501, Fall 2018  
Assignment 7, due Wednesday, October 10

**Exercises to hand in:**

1. Ross, Exercise 10.4.
2. Ross, Exercise 10.7.
3. Ross, Exercise 10.10.
4. Ross, Exercise 10.12.
5. Let  $x \in \mathbb{R}$  be a real number. Show that there exists a sequence  $(s_n)$  with  $s_n \in \mathbb{Q} - \{x\}$  for each  $n$  such that  $\lim s_n = x$ . In other words, prove that there exists a sequence of rationals not equal to  $x$  converging to  $x$ .
6. Compute  $\limsup_{n \rightarrow \infty} s_n$  and  $\liminf_{n \rightarrow \infty} s_n$  for the following sequences, fully justify your answer by appealing to the definition of the limit supremum and limit infimum.
  - (a)  $s_n = (-1)^n + \frac{1}{n}$ .
  - (b)  $s_n = (-2)^n$ .
  - (c)  $s_n = n$ .
  - (d)  $s_{2k-1} = 0, s_{2k} = -k^2$  (which defines the sequence for even and odd  $n$  respectively).

**On your own:** Ross, Exercises 10.1, 10.2, 10.9, 10.11.

**Reading:** Ross, §10-11.