Math 445 – David Dumas – Spring 2018

Homework 2

Due Monday, February 5 in class (1:00pm)

Follow the same instructions given on Homework 1.

Notation. The textbook uses $\mathbb{Z}_+$ to denote the set of positive integers. In class we have called this set $\mathbb{N}$. You may use either notation in your solutions.

(—) From the textbook: 16.3, 16.4, 16.7, 17.6, 17.8.

(P1) The rationals $\mathbb{Q}$ are a subset of the ordered set of real numbers $\mathbb{R}$. Is the subspace topology on $\mathbb{Q}$ the same as its order topology?

(P2) Let $A_+ = \left\{\frac{1}{n} \,|\, n \in \mathbb{N}\right\}$, and $A_- = \left\{-\frac{1}{n} \,|\, n \in \mathbb{N}\right\}$. Determine the closures $\bar{A}_+$ and $\bar{A}_-$ with respect to each of the following topologies on $\mathbb{R}$:

(a) The trivial topology
(b) The cofinite topology (which is also known as the finite complement topology)
(c) The standard topology
(d) The lower limit topology
(e) The discrete topology

Notes:

(1) This assignment was edited on February 2 to delete a hint about problem 16.7 that was irrelevant to that problem. The assignment itself has not changed.

(2) Problem 16.8 in the textbook is *not* part of this homework assignment. However, if you decide to work on that problem, here is a hint: You will need to consider several cases, depending on the direction of the line L.