Math 315
Homework #11
5/16/2017

Problem A; Abbott: 3.4.5, 3.4.7

A

(a) Find an example of a disconnected set whose closure is connected.

(b) If A is connected, is $\overline{A}$ necessarily connected?

3.4.5 Let A and B be nonempty subsets of $\mathbb{R}$. Show that if there exist disjoint open sets U and V with $A \subseteq U$ and $B \subseteq V$, then A and B are separated.

3.4.7 A set E is *totally disconnected* if, given any two distinct points $x, y \in E$, there exist separated sets A and B with $x \in A$, $y \in B$, and $E = A \cup B$.

(a) Show that $\mathbb{Q}$ is totally disconnected.

(b) Is the set of irrational numbers totally disconnected?