

Week 6 7 February 2011 through 11 February 2011 Math 315

Read Sections 3.1, 3.2, 3.3

Do: Section 3.2: 3.2.1, 3.2.2, 3.2.3.

Do: Section 3.3: 3.3.1, 3.3.2, 3.3.4, 3.3.7.

Problem R6.1

- (1) Show that every open set in \mathbb{R} is the disjoint union of either a finite or an infinite sequence of open intervals.
- (2) Find the closure of the following sets
 - (a) The set of rationals between 0 and 1.
 - (b) $[0, 1)$.
 - (c) $[0, 1]$.
 - (d) Let S be the set of all points $\{(-1)^n + \frac{1}{n}\}$ for $n = 1, 2, \dots$
 - (e) The set of irrationals between 0 and 1.
- (3) Let K be a compact set and let x_n be a sequence of points in K . Show that x_n has a subsequence x_{n_k} which converges to a point of K .
- (4) Show the finite union of compact sets is compact.
- (5) Give an example to show the arbitrary union of compact sets need not be compact.
- (6) Show the arbitrary intersection of compact sets is either compact or empty. (One can argue about whether the empty set is compact).

