Instructions: Starred (⋆) problems will be graded based on completion. Circled problems (◦) will be graded based on correctness of solution. Unmarked problems ( ) will not be graded and do not have to be turned in.

1 Due June 27

Problem 1.1 (◦) Show that the arbitrary union of open sets of a metric topology is an open set. Show that a finite intersection of open sets of a metric topology is an open set.

Problem 1.2 (⋆) Show that a subset $C$ of $\mathbb{R}^n$ with the Euclidean topology is closed if and only if it contains all of its limit points (cf. Definition 1.4.9 of [MP]).