

MATH 345 Exam 2

T.J. Liggett

April 2021

1 Problems

11. Let X be a topological space, let Y be a subset of X , and let A be a subset of Y . If A is closed in Y and Y closed in X , show that A is closed in X .

Proof. Let X be a topological space, let Y be a subset of X , and let A be a subset of Y . Assume A is closed in Y and Y is closed in X . Since A is closed in the subspace topology on Y , $A = D \cap Y$ for some closed set D in X , by Theorem 3.4. Because D and Y are both closed sets in X , it follows by Theorem 1.17 that the intersection of closed sets $D \cap Y$ is closed in X . Thus, A is closed in X . Therefore, if A is closed in Y and Y closed in X , then A is closed in X .

□