question 2 views

Daily Challenge 22.2

(~~**Due: Wednesday 2/20 at 12:00 noon Eastern**~~)
(**Due: Thursday 2/21 at 12:00 noon Eastern**)

In session 50 we introduced Jordan measure. Today you'll practice some proofs involving basic measure theory.

(1) Problem: some Terry Tao reading.

Read pages 2-5 of Terry's book here, from "1.1. Prologue: the problem of measure" to Exercise 1.1.1.

I already did the first part of Exercises 1.1.1, involving unions, for you in session 50; now you'll try some of the other parts. Answer on Overleaf.

(a) Do the part about translates: prove that $E + x = \{y + x \mid x \in E\}$ is elementary.

[Hints: just write out carefully what this means. You're adding some constant $x = (x_1, \cdots, x_n)$ to every point in E. But E was a finite union of boxes, so the translated result will be a finite union of boxes all shifted by x.]

(b) Attempt the part about intersections: prove that $E \cap F$ is elementary. This is harder. If you get stuck, just write up some thoughts (as usual, you must say *something* that required a non-zero amount of thought, rather than "I don't know how to start.")

[Hints: we saw way back in chapter 1 that intersections distribute over unions: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ So an intersection of elementary sets can be written as a union of intersections of boxes. Can you prove that an intersection of boxes is elementary? Start in one dimension: can you prove that an intersection of two intervals is an interval?]

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Updated 1 month ago by Christian Ferko

the students' answer, *where students collectively construct a single answer*

green boi

Updated 1 month ago by Logan Pachulski

the instructors' answer, *where instructors collectively construct a single answer*

Answer on Overleaf: https://www.overleaf.com/1231232126rckrscxfchyf

Updated 1 month ago by Christian Ferko

followup discussions *for lingering questions and comments*