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Topology
HW 4 Comments
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Announcements:

- Send errata to me
- When2Meet for writing style tutoring stuff

# 1 Writing Style Comments

**A1.** TL;DR — Don't be afraid to introduce new notation if you feel it's helpful. But if you choose to do so, you should *define it explicitly* at the beginning of your proof.

Here's an example. In a problem like 4.31, you might consider using angled brackets to distinguish points from intervals. E.g., you could use $\langle a, b\rangle$ to denote a point in $\mathbb{R}^2$, and $(a, b)$ to denote the interval $(a, b) \subset \mathbb{R}$ (In LaTeX, $\langle a, b\rangle$ can be generated with `$\langle a,b \rangle$`).

If you choose this approach, you should begin your proof with something like "to avoid confusion, we will denote points of $\mathbb{R}^2$ with angled brackets (e.g. $\langle a, b\rangle$), and intervals in $\mathbb{R}$ with the usual $(a, b)$, $[a, b]$, etc."

If you choose not to create new notation, you should be sure to explicitly draw attention to when you're treating $(a, b)$ as a point vs. as an interval. There are a few things you can do to make this natural:

(1) When you declare $(a, b)$, you should make the domain explicit by saying "let $(a, b) \in \mathbb{R}^2$" or "let $(a, b) \subset \mathbb{R}$." In fact, you should *always* do this with your variables, it's just particularly relevant here.
(2) Use variable symbols consistently. If you previously used $(a, b)$ to refer to a point in $\mathbb{R}^2$, you should not overwrite that declaration later by saying "let $(a, b) \subset \mathbb{R}$." Instead, you should choose different symbols. Usually $(a, b)$ is used for intervals, and $(x, y)$ for points — consider employing this scheme.
(3) Consider using vector notation. E.g.,

> Let $(X_{\text{sq}}, \mathcal{T}_{\text{sq}})$ denote the lexicographically ordered square, and let $\mathcal{B}_{\text{sq}}$ be the canonical basis for $\mathcal{T}_{\text{sq}}$. Denote elements of $\mathcal{B}_{\text{sq}}$ by $(\mathbf{u}, \mathbf{v})$, where $\mathbf{u}, \mathbf{v} \in X_{\text{sq}}$ (using square brackets as appropriate if $\mathbf{u} = \mathbf{0}$ or $\mathbf{v} = \mathbf{1}$).

**A2.** Elegance, and combining similar casework

**A3.** "Consider" and "take"

**A4.** How to identify when to give a WTS. Also, justification comes before assertions. Assertions $\neq$ WTSs.

# 2 Correctness

## 2.1 Exercise 4.41

**B2.** Don't label $\mathbb{R}_\alpha$! This is only for when the sets in our product are distinct

### 2.2 Exercise 5.5

**B1.** It's a bit hazardous to try and make an argument based on the *form* of arbitrary open sets in $\mathbb{R}_{\text{LL}}$.

## 3 Comments on TeX / Notation