Friday - Week 8

Tool: $\bar{A} = A \cup A'$

Limit Points

2.13 $A = (0,1]$ in $(\mathbb{R}, LLT)$

$A' = [0,1)$ $\qquad$ $1 \notin A'$ b/c $1 \in \underset{\text{open}}{[1,2)}$ & $[1,2) \cap A = \{1\}$

(a) $\bar{A} = [0,1]$

(b) $A = \{a\}$ $\quad X = \{a,b,c\}$, $\quad \tau = \{X, \phi, \{a\}, \{a,b\}\}$

$\bar{A} = \{a, b, c\} = A \cup A'$

So $A' = \{b,c\}$

(c) Same τ, $A = \{a,c\}$

$\bar{A} = \{a,c,b\} = A \cup A'$

$A' = \{b,c\}$

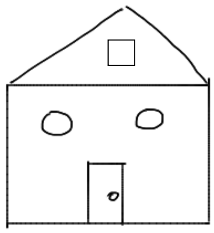
(d) $A = \{b\}$ $\quad$ Same τ

$\bar{A} = \{b,a,c\} = A \cup A'$

$A' = \{a,c\}$

(g) $\underset{\text{x-axis}}{A} = \{\underbrace{(x,0)}_{\text{points / vectors}} \in \mathbb{R}^2 \mid x \in \mathbb{R}\} \subset \mathbb{R}^2$ w/ std. $= \longleftrightarrow$

$\bar{A} = A$ (x-axis is closed in std. top. on $\mathbb{R}^2$)



$= X$

Let X be the following text!

This set is not open

Std top on $\mathbb{R}^2$

F.C.T. on $\mathbb{R}^2$

Subspace top on X.

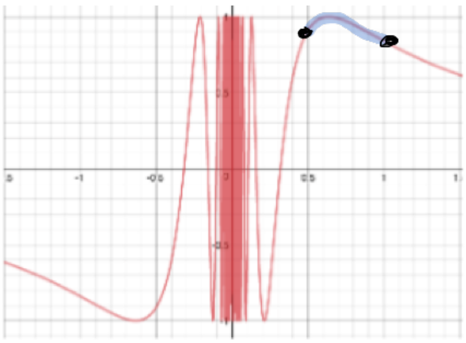
Discrete top $\mathbb{R}^2$

13 Prove if X is Hausdorff then every singleton $\{x\}$ is closed.

Show $X - \{x\}$ is open. Let $y \in X - \{x\}$ be arbitrary.
then $\exists$ open set $U \ni y$ & $V \ni x$ that are disjoint. This applies to every y in the complement. Each of the U nbhds are disjoint from X, thus contained in the complement

$\Rightarrow X - \{x\}$ is open.

7.



Std on $\mathbb{R}^2$	Subspace on X
open: NO	is X open in this? yes.
closed: yes	Is X closed in this, yes.

$X = \{(x, y) \mid y = \sin\left(\frac{1}{x}\right)\}$. , $Y = \{ (u,v) \in X$ s.t. $u \in [\frac{1}{2}, 1] \}$

Fact: $\underbrace{(0,w)}_{\text{the vector/point not interval}} \notin X$ for any w