

## Questions of the Day:

### 1. Heine-Borel Thm:

$A \subset \mathbb{R}^n$  is compact  $\Leftrightarrow A$  is closed and bounded

$A$  is given the subspace topology  
 $\mathbb{R}^n$  is given the standard topology

$\hookrightarrow$  every open cover  $\{U_\alpha\}_{\alpha \in A}$  has a finite subcover

$\hookrightarrow \{U_B\}_{B \in B \subset A}$

$A$  is closed, as a subset of  $\mathbb{R}^n$   
bounded means  $\exists r > 0, r \in \mathbb{R}$  st.  $A \subset \text{Ball}(0, r)$

$\hookrightarrow := \{U \subset \mathbb{R}^n \mid U \text{ is a union of open balls}\}$

given a topological space  $X$  and a subset  $A \subset X$ , the subspace topology on  $A$  is  $\{U \subset A \mid \exists V \in \mathcal{T}_X \text{ st. } U = A \cap V\}$

thm def:  
- useful  
- hard to prove

2. hw 4:  $\mathcal{T}_S =$  "the smallest topology containing  $S$ ". Does this mean  $\mathcal{T}_S$  is a topology?

Yes,  $\mathcal{T}_S := \bigcap_{\mathcal{J}' \supset S} \mathcal{J}'$

$A \rightarrow \mathcal{P}(X)$   
 $\alpha \mapsto U_\alpha$     $\bigcap_{\alpha \in A} U_\alpha = X$  if  $A = \emptyset$

### 3. Study tips

do the practice problems in email. [Math 4330] Midterm Practice Problems

4. Do posets connect w/ deterministic operations research?

$\mathbb{R}$  has a partial order called  $\leq$   
a minimum price is an element  $x \in \mathbb{R}$  st.  $\forall$