Topology – Homework 1

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2) If $\mathscr{T}$ and $\mathscr{T}'$ are topologies on X and $\mathscr{T}'$ is strictly finer than $\mathscr{T}$, what can you say about the corresponding subspace topologies on the subset Y of X?

You can say the subspace topology $\mathscr{S}$ inherited from $\mathscr{T}$ is strictly coarser than the subspace topology $\mathscr{S}'$ inherited from $\mathscr{T}'$.

3) Consider the set $Y = [-1,1]$ as a subspace of $\mathbb{R}$. Which of the following are open in Y and which are open in $\mathbb{R}$?

$$A = \{x \mid 0.5 < |x| < 1\}$$
$$B = \{x \mid 0.5 < |x| \leq 1\}$$
$$C = \{x \mid 0.5 \leq |x| < 1\}$$
$$D = \{x \mid 0.5 \leq |x| \leq 1\}$$
$$E = \{x \mid 0 < |x| < 1 \wedge x^{-1} \notin \mathbb{Z}^+\}$$

8) If L is a straight line in the plane, describe the topology L inherits as a subspace of $\mathbb{R}_l \times \mathbb{R}$ and as a subspace of $\mathbb{R}_l \times \mathbb{R}_l$. In each case it is a familiar topology.