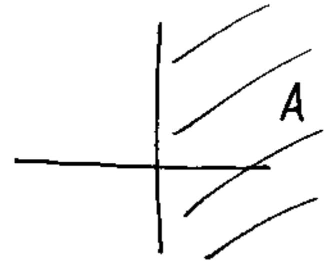
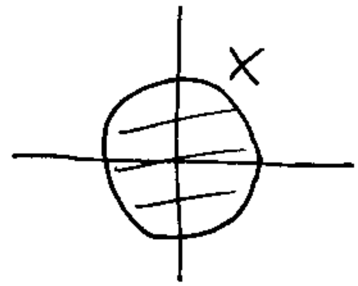
c)

$$A = \{ x = (x_1, x_2) \in \mathbb{R}^2 \mid x_1 > 0 \}$$



$$X = \{ x \in \mathbb{R}^2 \mid \|x\|^2 \leq 1 \}$$



A is not contained in X so it is not open in X.

2) $X \subset \mathbb{R}^n$ and $U \subset \mathbb{R}^n$ is open.

To show that $U \cap X$ is open in X we need to show that for each $x \in U \cap X$ there is an open ball in X, $U_r(x) \cap X$, such that

$$U_r(x) \cap X \subset U \cap X \qquad (?).$$

Now $x \in U$ and U open $\Rightarrow$ x is an interior point of U

$\Rightarrow$ for some $r > 0$ we have $U_r(x) \subset U$.

But $U_r(x) \subset U \Rightarrow U_r(x) \cap X \subset U \cap X$

i.e. $y \in U_r(x) \cap X \Rightarrow y \in U_r(x)$ and $y \in X$

$\Rightarrow y \in U$ and $y \in X$