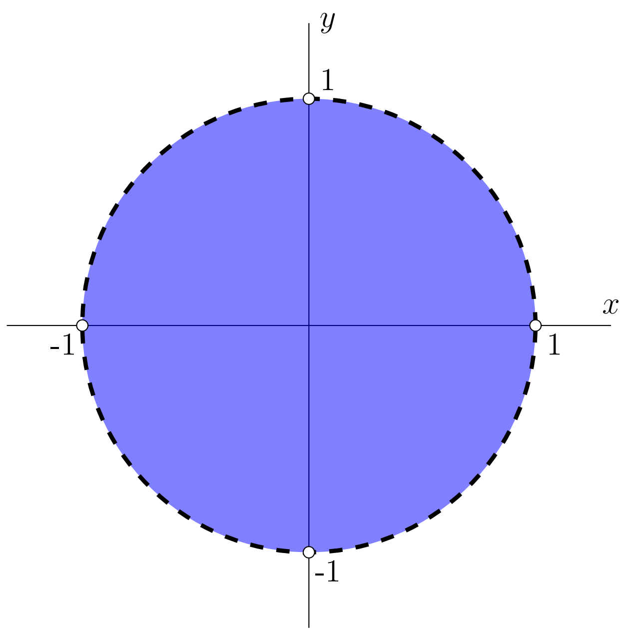
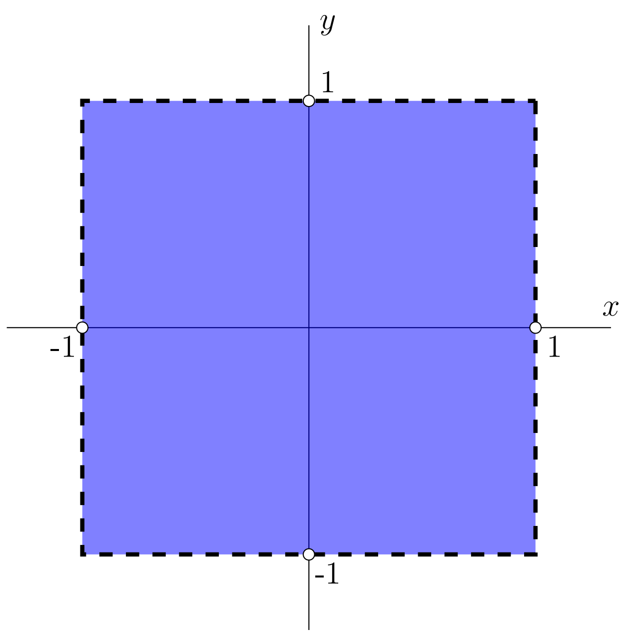
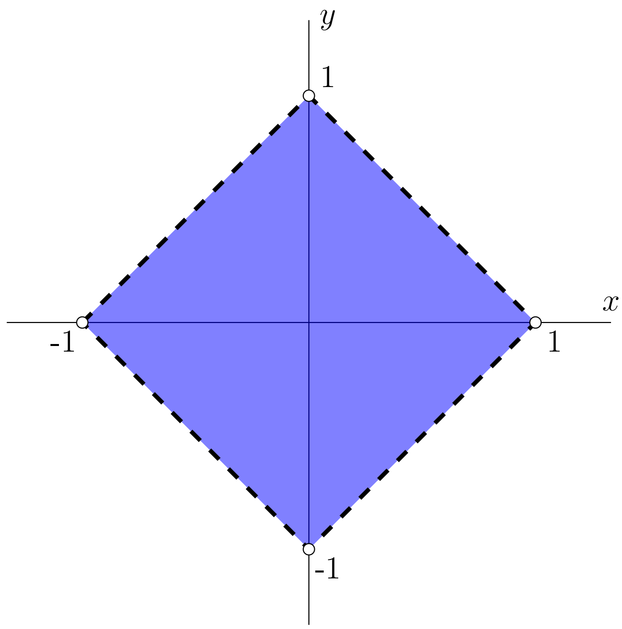
a.) In the metric space $(\mathbb{R}^2, d_{std})$, Ball$(0, 1)$ looks like



b.) In the metric space $(\mathbb{R}^2, d_{l^\infty})$, Ball$(0, 1)$ looks like



c.) In the metric space $(\mathbb{R}^2, d_{taxi})$, Ball$(0, 1)$ looks like



Let d_{std}, d_{l^∞}, and d_{taxi} be shorthand for their respective metric spaces.

It is clear that each set is open in its respective metric space. Now consider the openness of each set in d_{std}. Since the open balls in d_{l^∞} and d_{taxi} resemble open sets in standard Euclidian space, we know that they can be represented as a union of open balls, and thus are open in d_{std}.

Next, consider the openness of each set in d_{l^∞}. We know that the open ball in d_{l^∞} is open in d_{std}, thus it can be represented by a union of open balls, thus any union of open balls in d_{l^∞} is also a union of open balls in d_{std}. Finally, since we know that the open balls in d_{std} and d_{taxi} are open in d_{std}, they can also be represented as a union of open balls in d_{std}, and thus as a union of open balls in d_{l^∞}, thus each set is open in d_{l^∞}.

A an argument similar to the above one shows that each set is also open in d_{taxi}.