Quiz 2 – MATH 4580 Spring 2023

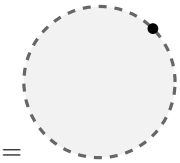
Recall:

- a neighborhood in $\mathbb{R}$ is an open interval, a neighborhood in $\mathbb{R}^2$ is the interior of a circle
- a set X is open means for all $y \in X$, there is a neighborhood N of y such that $N \subset X$
- a point p is called a limit point of X whenever given any neighborhood N of p, $N \setminus \{p\} \cap X$ is nonempty
- a set X is called closed whenever it contains all of its limit points, i.e. $\{p\colon p \text{ is a limit point of } X\} \subset X$.

Question: In the sets described below, is X an open set, a closed set, neither, or both? Why?

1. $(0,1) \cup (3,4) \subset \mathbb{R}$

2. $(0,1) \cup (3,4) \subset \mathbb{R}^2$

3. $X =$  (lives in $\mathbb{R}^2$)

4. $X =$  (lives in $\mathbb{R}^2$)

5. $X = \mathbb{R}^2 \subset \mathbb{R}^2$