Seminar O-minimal structures- Homework

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Exercise 1(3 points) *Show that the model-theoretic structure $(\mathbb{R}, <, 0, 1, 2)$ the definable set $\{(x, y) : 0 < x < 1, 0 < y < 2\} \cup \{(1, 2)\}$ is definable connected but not definably path connected (as defined on page 100).*

Exercise 2 (3 points) *Show that definable path connectedness is preserved under definable homeomorphisms. That is, let $X \subset R^m$ be definable and definably path connected, and let $f : X \to Y \subset R^m$ be a definable homeomorphism, show that Y is definably path connected.*

Exercise 3 (4 points) *Let X be a definable set that is definably connected. Show that we can write X as a union of cells $C_1, \cdots, C_k$, where for each $i < k$, either C_i intersects the closure of C_{i+1} ir C_{i+1} intersects the closure of C_i. (Hint: Look at Exercise 5 on page 58)*