10.2 Topology in metric spaces [2C2]

Let (X, d) be a metric space.

Definition 10.19 (ball,disc)**.** *[ONW]*

Definition 10.20. *[ONX]*

Note that, having the operational definition [(9.22)] of ”open set”, then the axioms (in the definition [0G6]) in this case become theorems.

Exercises

E10.21 [0NZ]

E10.22 [0P1]

E10.23 [0P3]

E10.24 [0P5]

E10.25 [0P6]

E10.26 [0P8]

E10.27 [0PB]

E10.28 [0PD]

E10.29 [0PG]

E10.30 [0PJ]

E10.31 [0PM]

E10.32 [0PP]

E10.33 [0PQ]

E10.34 [0PR]

E10.35 [0PS]

E10.36 [0PT]

E10.37 [0PY]

E10.38 [0Q0]

E10.39 [0Q3]

E10.40 [0Q5]

E10.41 [0Q7]

E10.42 [0Q8]

E10.43 [0QC]

E10.44 [0QF]

10.2.1 Bases composed of balls

To face these exercises it is necessary to know the concepts seen in Sec. [2B5].

Exercises

E10.45 [OQJ]

E10.46 [OQM]

10.2.2 Accumulation points, limit points

Let's redefine this notion (a special case of what we saw in [OGY])

Definition 10.47 (accumulation point)**.** *[OQN]*

The set of accumulation points of A is called **derived set**, we will indicate it with $D(A)$.

Exercises

E10.48 [OQP]

E10.49 [OQR]

E10.50 [OQS]

E10.51 [OQV]

Let's add this definition (a special case of [2B4]).

Definition 10.52 (limit point)**.** *[OQX]*

In English literature the terms *"cluster point"*, *"limit point"* and *"accumulation point"* are sometimes considered synonimous, which can be confusing. We will stick to the proposed definitions [OQN] and [OQX].

Exercises

E10.53 [OQY]

E10.54 [OQZ]

E10.55 [2F3]

QuasiEsercizio 34. *[OR1]*

Other exercises on these topics are [OS8], [OSB], [OSD], [OSN] and [OT5].