

## MIDTERM 2 TOPICS

Here is a list of the main topics we've covered since the first midterm. Note that this list is not necessarily exhaustive. You will also be expected to know the material from before the first midterm, although it won't be the primary focus.

- definition of a metric space, basic examples (subsets of  $\mathbb{R}^n$ , the discrete metric, finite metric spaces, etc)
- sequences and convergence
- open and closed subsets
- continuous functions:  $(\epsilon, \delta)$  definition of continuity, sequential continuity, topological continuity
- basics of topology (definition of a topological space, “topological properties” of a metric space)
- homeomorphisms and isometries
- closure and interior
- the inheritance principle
- product metrics
- Cauchy sequences and completeness
- compactness: sequential and covering characterizations, basic properties, relationships with continuous functions, Heine–Borel theorem, Cantor intersection theorem
- connectedness and path connectedness (examples and counterexamples, generalized intermediate value theorem)
- cluster points and isolated points, perfect metric spaces
- the Cantor set (definition, key properties)