

# Mathematical Economics

Midterm Examination

April 11, 2024

*Please, answer the following 3 questions. **Time allowed:** one hour and 30 minutes. PLEASE PLEASE, make an effort to write in a legible and organized fashion.*

**Question 1.** Open and closed sets, closures and interiors, in general metric spaces. Show that  $A$  is open iff  $A^\circ = A$  and  $A$  is closed iff  $\bar{A} = A$ .

**Question 2.** Totally bounded sets. Definition, properties and characterization(s). If  $A \subset B \subset M$  and if  $B$  is totally bounded in the metric space  $M$ , show that  $A$  is totally bounded.

**Question 3.** Continuity of functions on metric spaces: Definition, properties and characterization(s). Upper semicontinuity: Definition and relations to continuity, with (at least graphical) examples.