You can find information about the exercise class on our homepage. If you have problems with some of the exercises, the script (especially Appendix A) might be helpful.

**Exercise 1**
Let $X$ be a metric space and $A, B \subset X$ disjoint and closed. Show that there is a continuous map $f : X \to [0, 1]$ such that $f^{-1}\{0\} = A$ and $f^{-1}\{1\} = B$.

**Exercise 2**
Let $X$ be a metric space. Show that $X$ is totally bounded if and only if for all $\varepsilon > 0$ there is some compact $\varepsilon$-net in $X$.

**Exercise 3**
Let $X$ be a compact metric space and $f : X \to X$ such that $|x - y| \leq |f(x) - f(y)|$ for all $x, y \in X$. Show that $f$ is an isometry.

**Exercise 4**
Let $X$ be a complete metric space. Show that $X$ equipped with its induced length metric is also complete. (See p.16 for the definition of this metric.)