## Exercises

9.101 [0VT] Prerequisites:[0VS].Let $X = C^0([0,1])$ be the space of continuous and bounded functions $f : [0,1] \to \mathbb{R}$, endowed with the usual distance

$$d_\infty(f,g) = \|f-g\|_\infty = \sup_{x\in[0,1]} |f(x)-g(x)| \quad .$$

We know that $(X, d_\infty)$ is a complete metric space. Let

$$D(0,1) = \{f \in X : d_\infty(0,f) \le 1\} = \{f \in X : \forall x \in [0,1], \quad |f(x$$

the disk of center 0 (the function identically zero) and radius 1. We know from [0PY] that it is closed, and therefore it is complete. Show that $D$ is not totally bounded by finding a sequence $(f_n) \subseteq D$ as explained in [0VS].