Answer on Question #71759 – Math – Functional Analysis

Question

If A is a subspace of l^∞ consisting of all sequence of 0 and 1. What is the induced metric on A?

Solution

Recall that for any $x = (\xi_i) \in l^\infty$ and $y = (\eta_i) \in l^\infty$ we have that $d(x, y) = \sup_{i \in \mathbb{N}} |\xi_i - \eta_i|$. So, for any distinct $x, y \in A \subset l^\infty$, $d(x, y) = 1$ since they are sequences of zeros and ones.

Thus, the induced metric on A is the discrete metric, i.e. $d_A(x, y) = \begin{cases} 1, x \neq y \\ 0, x = y \end{cases}$.