Mathematical methods of signal and image processing

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Presence exercise sheet 7

Problem 1

Let X be a Pre-Hilbert space, i. e. a vector space with a scalar product. Denote the scalar by $(\cdot,\cdot)_X$ and the induced norm by $\|\cdot\|_X$, i. e. $\|x\|_X \coloneqq \sqrt{(x,x)}$. Let $x, y \in X$ and $(y_n), (x_n) \subset X^{\mathbb{N}}$ with $\|x_n - x\|_X \to 0$ and $\|y_n - y\|_X \to 0$. Then,

$$(x,y)_X = \lim_{n\to\infty} (x_n, y_n)_X.$$