MATB24. Quiz #5, TUT #19

(1) (4 point) In each part, give a complete definition, or mathematical characterization of the word in bold.
   (a) An **orthogonal set** of vectors

(2) (3 point) Give an example **(with justification)** of a mathematical object that satisfies all the described properties or explain why such an example does not exists.
   (a) A vector with length 1 with respect to the dot product but different length with respect to an inner product

(3) (8 point) Carefully prove the following.
   (a) $V = \mathbb{R}^2$, where **v** = $[v_1, v_2]$ and **w** = $[w_1, w_2]$, is an inner product space defined by

$$\langle \mathbf{v}, \mathbf{w} \rangle = 2v_1w_1 + 5v_2w_2.$$