5.1 b) Given an orthobasis for $L_2([0,1])$, describe how to construct an orthobasis for $L_2([0,1]^D)$ – the space of functions of D continuous-valued variables $x(t)$ such that

$$\int_0^1 \cdots \int_0^1 |x(t)|^2 dt_1 \cdots dt_D < \infty.$$

Based on our results from 5a) we have shown that constructing an orthobasis for $L_2([0,1]^2)$ can be done as a composition of orthobasis functions on the $L_2([0,1])$ space. Specifically $v_{k,l} = \psi_k(s)\psi_l(t)$ is an orthobasis for $L_2([0,1]^2)$. Extending this logic, $v_{k,l,\ldots,D}$ can be an orthobasis for $L_2([0,1]^D)$ where $\boxed{v_{k,l,\ldots,D} = \prod_{i=1}^{D} \psi_i(t_i).}$ Essentially there is an orthobasis function corresponding to each input dimension.