[5×2 pts.] Answer the following questions. **If True explain why and if False give an example.**

(a) Every orthonormal set is linearly independent. **T or F? Explain.**

(b) If $\langle x, y \rangle = 0$ for all $x$ in an inner product space, then $x = 0$. **T or F? Explain.**

(c) If $S$ is an orthogonal set in an inner product space with dimension $n$, then $|S| \leq n$. **T or F? Explain.**

(d) The following $\langle f, g \rangle = \int_{-1}^{1} f'(t)g'(t)dt$ is an inner product on $P_2(\mathbb{R})$. **T or F? Explain.**

(e) For a linear operator $S \in \mathcal{L}(V)$, we have $(S^*)^* = S$. **T or F? Explain.**