QUANTUM ALGORITHMS
HOMEWORK 6 ADDITIONAL PROBLEMS

PROF. MATTHEW MOORE

DUE: 2021-03-16

1. Prove that the inner product and the tensor product commute:
$$\langle \alpha \otimes \beta \mid \gamma \otimes \delta \rangle = \langle \alpha \mid \gamma \rangle \langle \beta \mid \delta \rangle .$$
This is asserted on page 57 of the textbook.

2. An n-ary function $f : \mathbb{B}^n \to \mathbb{B}$ is *idempotent* if
$$f(0, \ldots, 0) = 0 \qquad \text{and} \qquad f(1, \ldots, 1) = 1.$$
Find a basis $\mathcal{A}$ so that every idempotent Boolean function is representable as a circuit over $\mathcal{A}$. Prove your answer is correct. [*Hint 1: Post's Lattice.*] [*Hint 2: ? :.*]