

## CSEP 590tv In Class Problems, August 3, 2005

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1. Write out the four dimensional QFT as a four by four matrix in the computational basis. Recall that the four dimensional QFT is

$$U_{QFT} = \frac{1}{\sqrt{4}} \sum_{y=0}^3 \sum_{x=0}^3 \omega_4^{xy} |y\rangle \langle x|$$

where  $\omega_4 = e^{\frac{2\pi i}{4}} = e^{\frac{\pi}{2}} = i$ .

Suppose that the four dimensional QFT is applied to two qubits with the wave function  $|v\rangle = \frac{1}{\sqrt{2}}(|01\rangle + |11\rangle)$ . What is the resulting wave function?