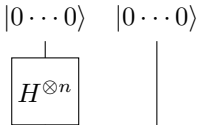
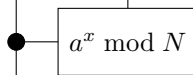


Quantum Hadamard Transform



Exponentiation



Measure  $y=a^b$



Quantum Fourier Transform



$$\sum_{x=0}^{2^n-1} |x\rangle |0\rangle$$

$$\sum_{x=0}^{2^n-1} |x\rangle |a^x \bmod N\rangle$$

$$\sum_{j=0}^{\lfloor \frac{2^n-1}{r} \rfloor} |b + jr\rangle [y]$$

$$\sum_{x=0}^{2^n-1} \left( \sum_{j=0}^{\lfloor \frac{2^n-1}{r} \rfloor} \omega^{x*(b+jr)} \right) |x\rangle$$