Phase estimation procedure

Best approximations

Suppose $y/2^m$ is the *best approximation* to θ:

$$\left|\theta - \frac{y}{2^m}\right|_1 \leq 2^{-(m+1)}$$

Then the probability to measure y will relatively high:

$$p_y \geq \frac{4}{\pi^2} \approx 0.405$$

Worse approximations

Suppose there's a *better approximation* to θ between $y/2^m$ and θ:

$$\left|\theta - \frac{y}{2^m}\right|_1 \geq 2^{-m}$$

Then the probability to measure y will be relatively low:

$$p_y \leq \frac{1}{4}$$