x_0 $\quad y_0 = f(x_0)$

x_1 $\quad y_1 = f(x_1)$

$y_0 = y_1$? $\qquad \xi = x_0 \oplus x_1$

Classical probability

$$P = \frac{1}{2^n - 1}$$

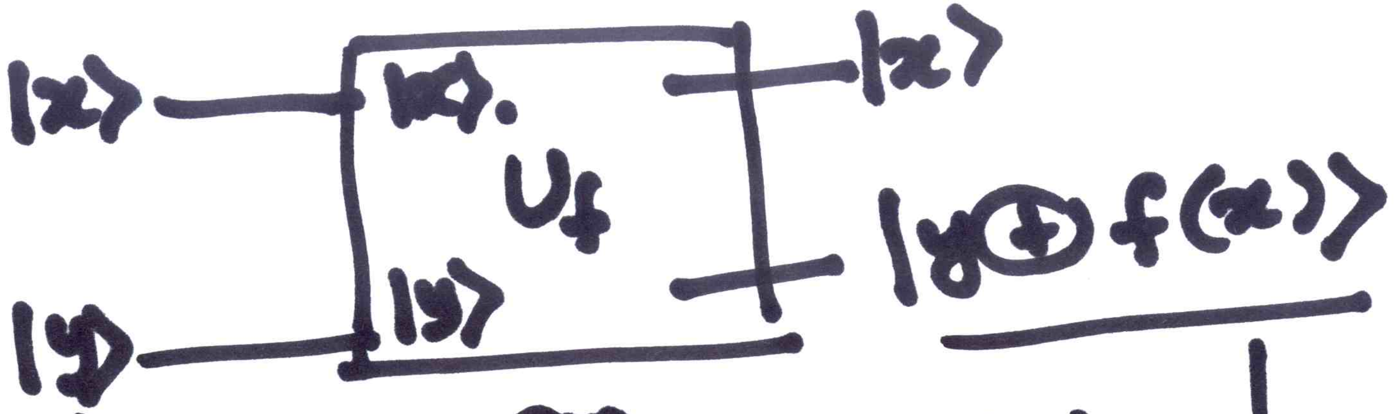
1st k- strings did not yield a match.

$${}^{k}C_2 = \frac{k(k-1)}{2} \text{ strings checked.}$$

Pick up (k+1)th string

? Prob. that y_k

$$P_k = \frac{k}{2^n - 1 - \frac{k(k-1)}{2}} \leq \frac{2k}{2^{n+1} - k^2}$$



$$|x\rangle^{\otimes n} = \frac{1}{\sqrt{N}} \sum_x |x\rangle$$

$f(x)$.

0

2 : 1 $\qquad \dfrac{1}{2^{n-1}}$

P(success in 1st m trials

$$P \le \sum_{k=2}^{m} \frac{2k}{2^{n+1} - k^2} \le \sum_{k} \frac{2m}{2^{n+1} - k^2} \le \frac{2m^2}{2^{n+1} - m^2}$$

$$= \frac{2m^2}{2^{n+1} - m^2}$$

$$\frac{2m^2}{2^{n+1} - m^2} \le \frac{3}{4}$$ Algorithm succeeds

$$m \ge \sqrt{\frac{6}{11} \times 2^n}$$ Complexity is exponential

$$\frac{1}{\sqrt{N}} \sum_{x} |x\rangle \otimes f(x)$$

Measure 2nd Register

1st Register contains

$$\frac{1}{\sqrt{2}} \left[|x_0\rangle + |x_0 + s\rangle \right].$$

$$\left[1+(-1)^{\xi \cdot y}\right].$$

$$\xi \cdot y = \xi_0 y_0 + \cdots + \xi_{n-1} y_{n-1} = 0$$