\[ x_0 \quad y_0 = f(x_0) \]

\[ x_1 \quad y_1 = f(x_1) \]

\[ y_0 = y_1 ? \quad \xi = x_0 \oplus x_1 \]

**Classical probability**

\[ P = \frac{1}{2^n - 1} \]
1st \( k \)-strings did not yield a match.

\[ kC_2 = \frac{k(k-1)}{2} \text{ strings checked.} \]

Pick up \((k+1)\)th string?

Prob. that \( y_k \)

\[ P_k = \frac{k}{2^n-1 - \frac{k(k-1)}{2}} \leq \frac{2k}{2^{n+1} - k^2} \]
\[ |x\rangle = \frac{1}{\sqrt{N}} \sum_{x} |x\rangle \]

2:1 \[ \frac{1}{2^n - 1} \]

- 4.
\( P(\text{success in 1st } m \text{ trials}) \leq \sum_{k=2}^{m} \frac{2k}{2^{m+1} - k^2} \leq \sum_{k=2}^{2m} \frac{2m}{k2^{m+1} - k^2} \leq \frac{2m^2}{2^{m+1} - m^2} = \frac{2m^2}{2^{m+1} - m^2} \)

\[
\frac{2m^2}{2^{m+1} - m^2} \leq \frac{3}{4}
\]

Algorithm succeeds

Complexity is exponential

\[
m \geq \sqrt{\frac{6 \times 2^n}{11}}
\]
\[
\frac{1}{\sqrt{N}} \sum_x |x\rangle \otimes f(x)
\]

Measure 2nd Register

1st Register contains

\[
\frac{1}{\sqrt{2}} \left[ |x_0\rangle + |x_0 + \delta\rangle \right]
\]
$\{1 + (-1)^n \}$.

$s_y = s_0 y_0 + \ldots + s_{n-1} y_{n-1} = 0$