Propagation Delay:

\[ A \xrightarrow{\text{NOT}} B \]

\[
\begin{array}{c|c}
A & 0 \\
B & 1 \\
\hline
t_{\text{propagation}} & \text{Time}
\end{array}
\]

- A memory should have at least three properties.
  1. It should be able to hold a value.
  2. You should be able to read the value that was saved.
  3. You should be able to change the value that's saved.

\[ Q_{t=0} = \]
\[ Q'_{t=0} = \]

**Case 1:** reset = set = 0 @ t = 0

\[ Q_{t=1} = \]
\[ Q'_{t=1} = \]

**Case 2:** reset = 1, set = 0 @ t = 0

\[ Q_{t=1} = \]
\[ Q'_{t=1} = \]

**Case 3:** reset = 0, set = 1 @ t = 0

\[ Q_{t=1} = \]
\[ Q'_{t=1} = \]

Synchronous Design:

<table>
<thead>
<tr>
<th>S</th>
<th>R</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>No change</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0 (reset)</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1 (set)</td>
</tr>
</tbody>
</table>

The D Flip Flop

Copies D input to Q on rising edge of clock.