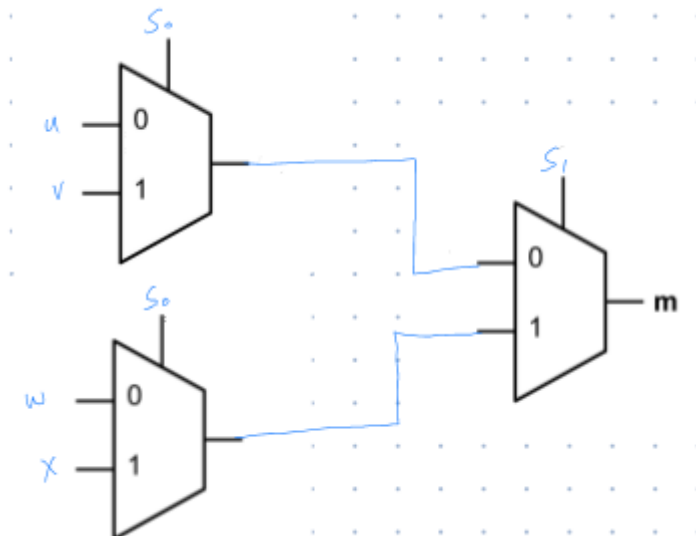


Part I: Input and outputs work as expected.

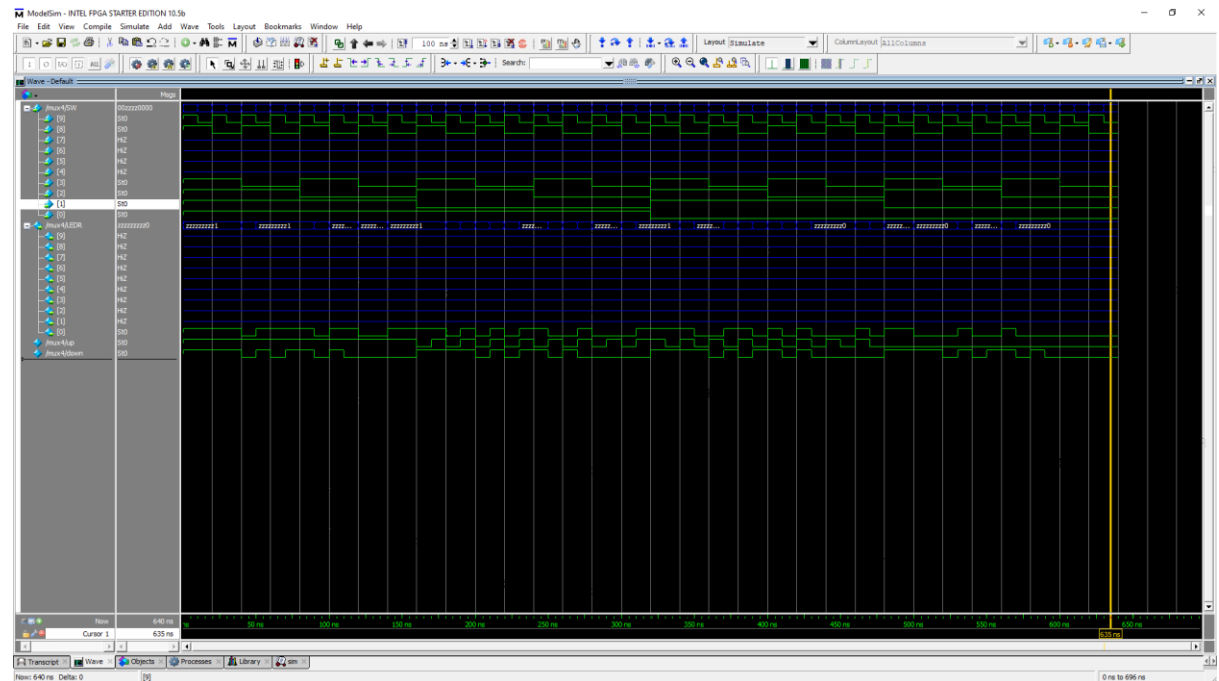
Part II:

1. There are 4 possible combinations of s_1 and s_0 , along with 16 possible combinations of u , v , w , and x . So multiplied together, there would be 64 rows in the table.



- 2.

5.



Simulation of 4to1 multiplexer.

Part III:

```
#
table = {
    '0000': ['0', '0', '0', '0', '0', '0', '1'], # 0
    '0001': ['1', '0', '0', '1', '1', '1', '1'], # 1
    '0010': ['0', '0', '1', '0', '0', '1', '0'], # 2
    '0011': ['0', '0', '0', '0', '1', '1', '0'], # 3
    '0100': ['1', '0', '0', '1', '1', '0', '0'], # 4
    '0101': ['0', '1', '0', '0', '1', '0', '0'], # 5
    '0110': ['0', '1', '0', '0', '0', '0', '0'], # 6
    '0111': ['0', '0', '0', '1', '1', '1', '1'], # 7
    '1000': ['0', '0', '0', '0', '0', '0', '0'], # 8
    '1001': ['0', '0', '0', '0', '1', '0', '0'], # 9
    '1010': ['0', '0', '0', '1', '0', '0', '0'], # A
    '1011': ['1', '1', '0', '0', '0', '0', '0'], # b
    '1100': ['0', '1', '1', '0', '0', '0', '1'], # C
    '1101': ['1', '0', '0', '0', '0', '1', '0'], # d
    '1110': ['0', '1', '1', '0', '0', '0', '0'], # E
    '1111': ['0', '1', '1', '1', '0', '0', '0']} # F
```

Truth table for 7 segment display

$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 1 & 0 & 0 \\ 01 & 1 & 0 & 1 & 0 \\ 11 & 0 & 0 & 0 & 1 \\ 10 & 0 & 0 & 0 & 0 \end{array}$ $\text{HEX}[D] = \bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D$ $+ \bar{A} \cdot \bar{B} \cdot C \cdot \bar{D} + A \cdot \bar{B} \cdot \bar{C} \cdot D$ $+ A \cdot \bar{B} \cdot C \cdot D$	$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 0 & 1 & 0 \\ 01 & 0 & 1 & 0 & 0 \\ 11 & 0 & 0 & 1 & 1 \\ 10 & 0 & 1 & 1 & 0 \end{array}$ $\text{HEX}[C] = \bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D$ $+ B \cdot \bar{C} \cdot D + A \cdot \bar{B} \cdot \bar{D}$ $+ A \cdot C \cdot D$	$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 0 & 1 & 0 \\ 01 & 0 & 0 & 0 & 0 \\ 11 & 0 & 0 & 1 & 0 \\ 10 & 1 & 0 & 1 & 0 \end{array}$ $\text{HEX}[D] = \bar{A} \cdot \bar{B} \cdot C \cdot \bar{D}$ $+ A \cdot \bar{B} \cdot C \cdot \bar{D} + A \cdot \bar{B} \cdot \bar{D}$ $= \bar{A} \cdot \bar{B} \cdot C \cdot \bar{D} + A \cdot \bar{B} \cdot (C + \bar{D})$	$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 1 & 0 & 0 \\ 01 & 1 & 0 & 0 & 0 \\ 11 & 0 & 1 & 1 & 0 \\ 10 & 0 & 0 & 0 & 1 \end{array}$ $\text{HEX}[B] = \bar{A} \cdot \bar{B} \cdot \bar{C} \cdot D$ $+ \bar{A} \cdot \bar{B} \cdot C \cdot \bar{D} + B \cdot C \cdot D$ $+ A \cdot \bar{B} \cdot C \cdot \bar{D}$
$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 1 & 0 & 0 \\ 01 & 1 & 1 & 0 & 1 \\ 11 & 1 & 1 & 0 & 0 \\ 10 & 0 & 0 & 0 & 0 \end{array}$ $\text{HEX}[A] = \bar{A} \cdot D +$ $\bar{A} \cdot \bar{B} \cdot C + \bar{B} \cdot C \cdot D$	$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 0 & 0 & 0 & 0 \\ 01 & 1 & 0 & 1 & 0 \\ 11 & 1 & 1 & 0 & 0 \\ 10 & 1 & 0 & 0 & 0 \end{array}$ $\text{HEX}[E] = \bar{A} \cdot \bar{B} \cdot D$ $+ \bar{A} \cdot \bar{B} \cdot C + A \cdot \bar{B} \cdot C \cdot D$ $+ A \cdot \bar{B} \cdot \bar{C} \cdot D$ $= \bar{A} \cdot \bar{B} \cdot (D + C)$ $+ \bar{A} \cdot C \cdot D + A \cdot \bar{B} \cdot \bar{C} \cdot D$	$\begin{array}{c cccc} AB \backslash CD & 00 & 01 & 11 & 10 \\ \hline 00 & 1 & 0 & 1 & 0 \\ 01 & 1 & 0 & 0 & 0 \\ 11 & 0 & 1 & 0 & 0 \\ 10 & 0 & 0 & 0 & 0 \end{array}$ $\text{HEX}[B] = \bar{A} \cdot \bar{B} \cdot \bar{C}$ $+ A \cdot \bar{B} \cdot C \cdot D + A \cdot \bar{B} \cdot \bar{C} \cdot D$	

Boolean functions for each HEX node.

Waveforms:

