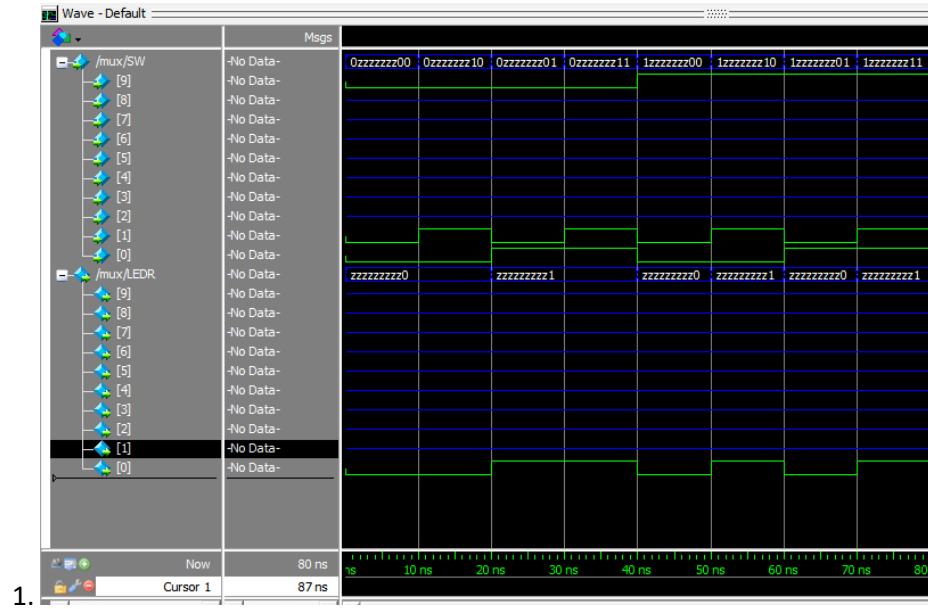


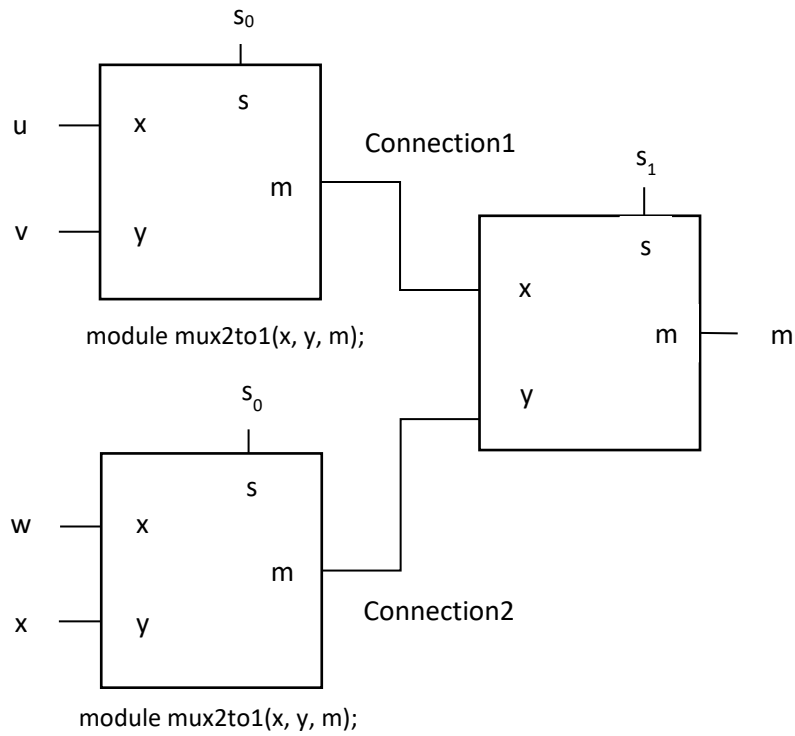
# Prelab 2

## Part I

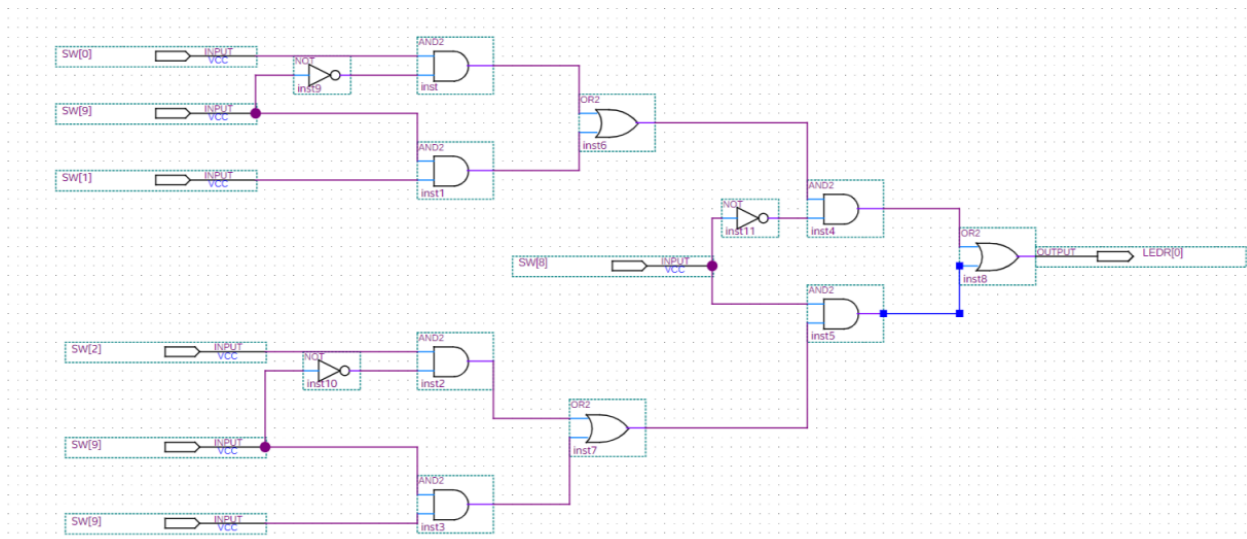


## Part II

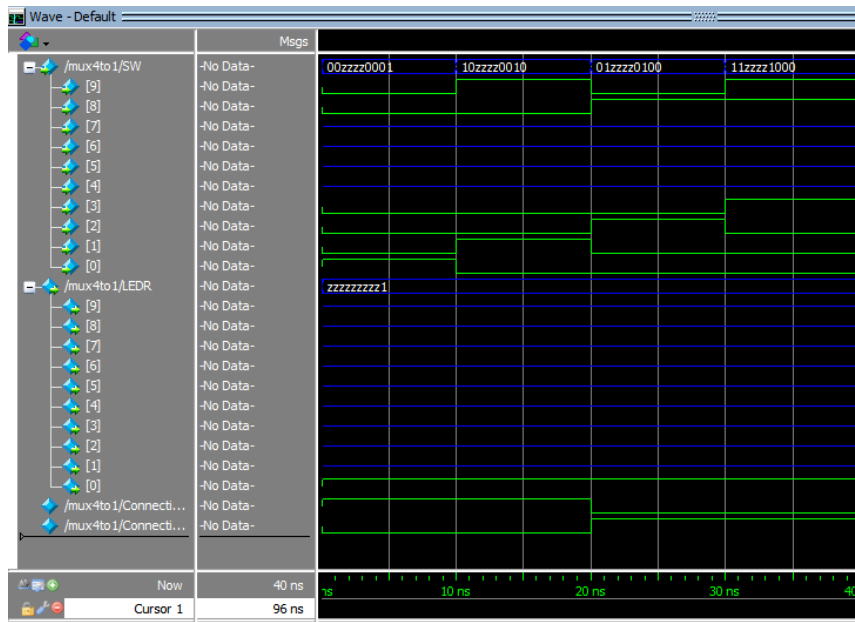
1. There are 64 rows.
- 2.



### 3. mux4to1.v



5.



## Part III

1. **Segment 0:** activate for values 0, 2, 3, 5, 6, 7, 8, 9, A, C, E, F

Truth table

$X_3$	$X_2$	$X_1$	$X_0$	HEX0 <sub>0</sub>
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

Boolean functions

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot \overline{x_0}$	$x_1 \cdot x_0$
$\overline{x_3} \cdot \overline{x_2}$	0	1	0	0
$\overline{x_3} \cdot x_2$	1	0	0	0
$x_3 \cdot \overline{x_2}$	0	1	0	0
$x_3 \cdot x_2$	0	0	1	0

$$\text{HEX0}_0 = \overline{x_3} \cdot \overline{x_2} \cdot \overline{x_1} \cdot x_0 + \overline{x_3} \cdot x_2 \cdot \overline{x_1} \cdot \overline{x_0} + x_3 \cdot x_2 \cdot \overline{x_1} \cdot x_0 + x_3 \cdot \overline{x_2} \cdot x_1 \cdot x_0$$

**Segment 1:** activate for values 0, 1, 2, 3, 4, 7, 8, 9, A, d

Truth table

$x_3$	$x_2$	$x_1$	$x_0$	$\text{HEX0}_1$
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	0	0	0	0
$\overline{x_3} \cdot x_2$	0	1	0	1
$x_3 \cdot x_2$	1	0	1	1
$x_3 \cdot \overline{x_2}$	0	0	1	0

Boolean functions

$$\text{HEX0}_1 = \overline{x_3} \cdot x_2 \cdot \overline{x_1} \cdot x_0 + x_2 \cdot x_1 \cdot \overline{x_0} + x_3 \cdot x_2 \cdot \overline{x_0} + x_3 \cdot x_1 \cdot x_0$$

**Segment 2:** activate for values 0, 1, 3, 4, 5, 6, 7, 8, 9, A, b, d

Truth table

$x_3$	$x_2$	$x_1$	$x_0$	$\text{HEX0}_2$
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	0	0	0	1
$\overline{x_3} \cdot x_2$	0	0	0	0
$x_3 \cdot x_2$	1	0	1	1
$x_3 \cdot \overline{x_2}$	0	0	0	0

1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

Boolean functions

$$\text{HEX}0_2 = \overline{x_3} \cdot \overline{x_2} \cdot x_1 \cdot \overline{x_0} + x_3 \cdot x_2 \cdot x_1 + x_3 \cdot x_2 \cdot \overline{x_0}$$

**Segment 3:** activate for values 0, 2, 3, 5, 6, 8, 9, b, C, d, E

Truth table

X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	HEX0 <sub>3</sub>
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	0	1	0	0
$\overline{x_3} \cdot x_2$	1	0	1	0
$x_3 \cdot x_2$	0	0	1	0
$x_3 \cdot \overline{x_2}$	0	0	0	1

Boolean functions

$$\text{HEX}0_3 = \overline{x_3} \cdot \overline{x_2} \cdot \overline{x_1} \cdot x_0 + \overline{x_3} \cdot x_2 \cdot \overline{x_1} \cdot \overline{x_0} + x_2 \cdot x_1 \cdot x_0 + x_3 \cdot \overline{x_2} \cdot x_1 \cdot \overline{x_0}$$

**Segment 4:** activate for values 0, 2, 6, 8, A, b, C, d, E, F

Truth table

X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	HEX0 <sub>4</sub>
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	0	1	1	0
$\overline{x_3} \cdot x_2$	1	1	1	0
$x_3 \cdot x_2$	0	0	0	0
$x_3 \cdot \overline{x_2}$	0	1	0	0

0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Boolean functions

$$\text{HEX0}_4 = \overline{x_3} \cdot x_0 + \overline{x_2} \cdot \overline{x_1} \cdot x_0 + \overline{x_3} \cdot x_2 \cdot \overline{x_1}$$

**Segment 5:** activate for values 0, 4, 5, 6, 8, 9, A, b, C, E, F

Truth table

X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	HEX0 <sub>5</sub>
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	0	1	1	1
$\overline{x_3} \cdot x_2$	0	0	1	0
$x_3 \cdot x_2$	0	1	0	0
$x_3 \cdot \overline{x_2}$	0	0	0	0

Boolean functions

$$\text{HEX0}_5 = \overline{x_3} \cdot \overline{x_2} \cdot x_0 + \overline{x_3} \cdot \overline{x_2} \cdot x_1 + \overline{x_3} \cdot x_1 \cdot x_0 + x_3 \cdot x_2 \cdot \overline{x_1} \cdot x_0$$

**Segment 6:** activate for values 2, 3, 4, 5, 6, 8, 9, A, b, d, E, F

Truth table

X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	HEX0 <sub>6</sub>
0	0	0	0	1
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Karnaugh maps

	$\overline{x_1} \cdot \overline{x_0}$	$\overline{x_1} \cdot x_0$	$x_1 \cdot x_0$	$x_1 \cdot \overline{x_0}$
$\overline{x_3} \cdot \overline{x_2}$	1	1	0	0
$\overline{x_3} \cdot x_2$	0	0	1	0
$x_3 \cdot x_2$	1	0	0	0
$x_3 \cdot \overline{x_2}$	0	0	0	0

Boolean functions

$$\text{HEX0}_6 = \overline{x_3} \cdot \overline{x_2} \cdot \overline{x_1} + x_3 \cdot x_2 \cdot \overline{x_1} \cdot \overline{x_0} + \overline{x_3} \cdot x_2 \cdot x_1 \cdot x_0$$

3.

