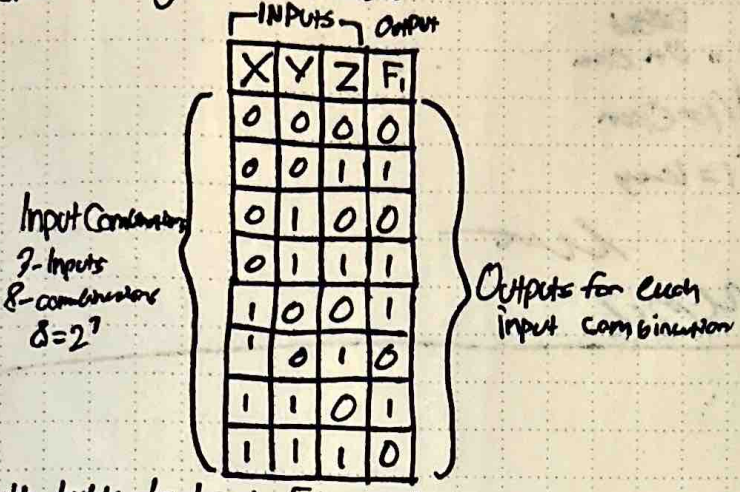
Truth Table Construction

- A truth table shows how the logic design output respond to all combinations of inputs
- A logic design with N inputs will have 2^N input combinations
- Truth table inputs are listed in ascending binary count order in the left-most columns
- Truth table output(s) are listed in columns to the right of the inputs (where some logic circuits have more than one output)

Constructing A Truth Table



Truth table to Logic Expression

- Write a minterm adjacent to every row in the truth table that contains a one in the output column
- Write the Sum-of-products (SOP) logic expression by summing all of the minterms

$$F_S = \bar{X}\bar{Y}Z + \bar{X}Y\bar{Z} + X\bar{Y}\bar{Z} + XY\bar{Z}$$

SOP Logic Expression

Truth Table to Logic Expression Example

$$F_6 = \bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}CD + A\bar{B}CD + AB\bar{C}D + ABCD$$

$$F_7 = \bar{X}\bar{Y}\bar{Z} + XZ + \bar{X}\bar{Y}Z$$

Design Specifications to Truth Table

1. Identify the number of variables
2. Assign variable names and establish the assignment condition for each variable
   e.g. what does a 0 or 1 mean for that input?
3. Create a truth table

Signature:	Date:	Team Members:
Witness:	Date:	
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Title: AOI Design: Truth table to Logic Expression

Example

P: Pressure Sensor → 0=Safe/1=Unsafe
T: Temperature Sensor → 0=Safe/1=Unsafe
A: Alarm → 0=Alarm off/1=Alarm on

P	T	A
0	0	0
0	1	1
1	0	1
1	1	1

Example #2

W: Window sensor → 0=Off/1=On Open
D: Door Sensor → 0=Closed/1=Open
K: Key → 0=No key/1=key

$S = K\overline{D} + K\overline{W}$

11/14/22

Signature: [signature] Date: 11/14/22 Team Members:

Witness: Date:

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