Zen Park

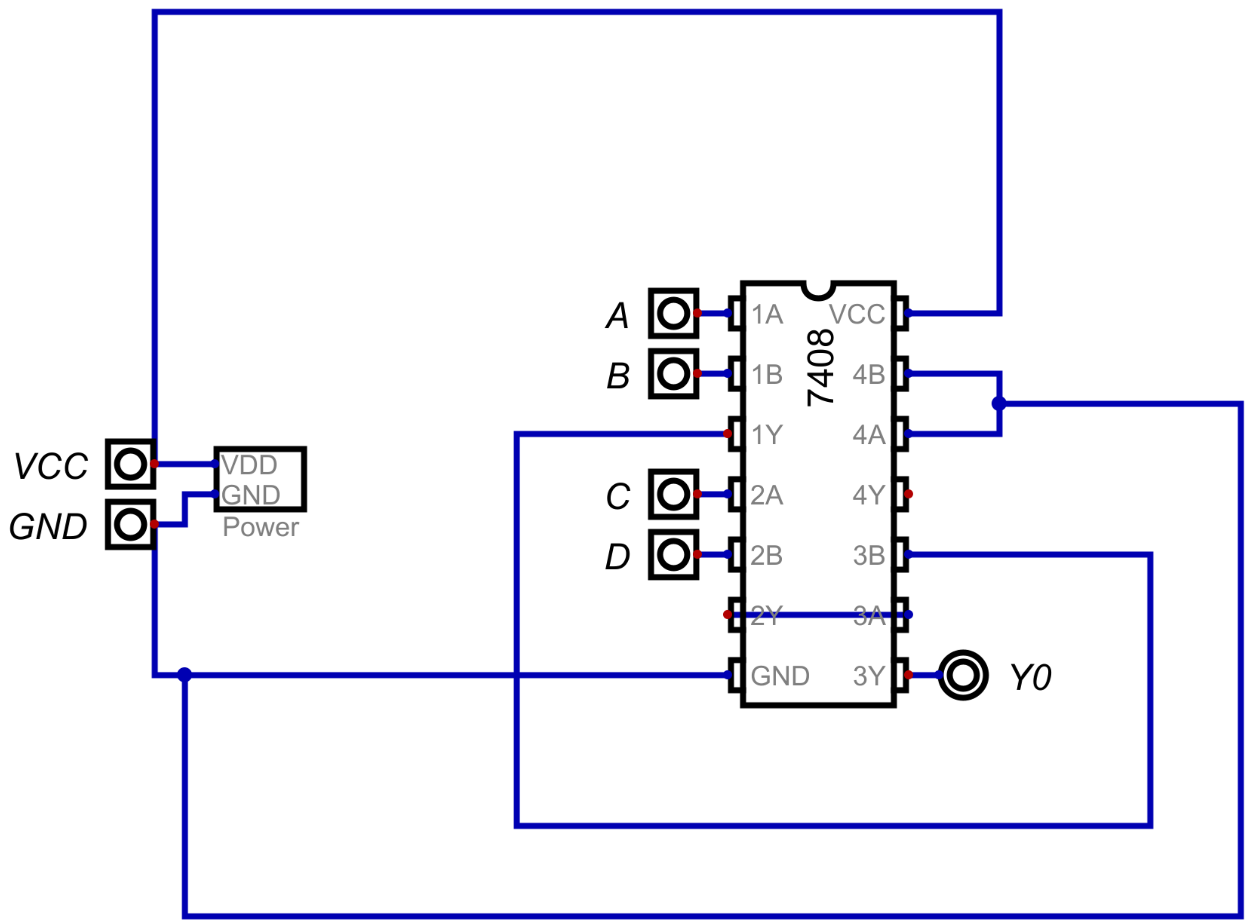
WXP190001

Lab 1

CS 4141.6U1
Digital Systems Laboratory Su21

$Y=(A \bullet B) \bullet (C \bullet D)$

AND



Truth Table:

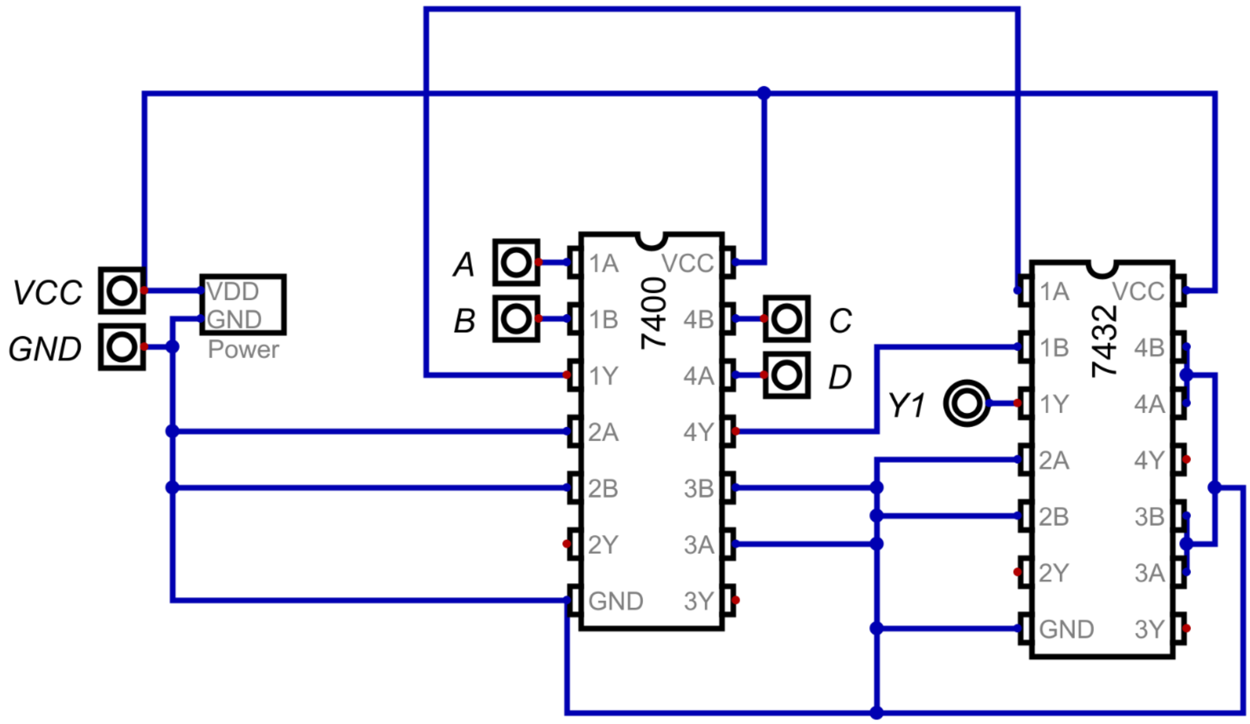
A	B	C	D	Y0
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

$Y0 = A \wedge B \wedge C \wedge D$

A, B, C, and D must all be turned on in order for the output to light up.

$Y = [\sim(A \bullet B)] + [\sim(C \bullet D)]$

NAND OR



Truth Table:

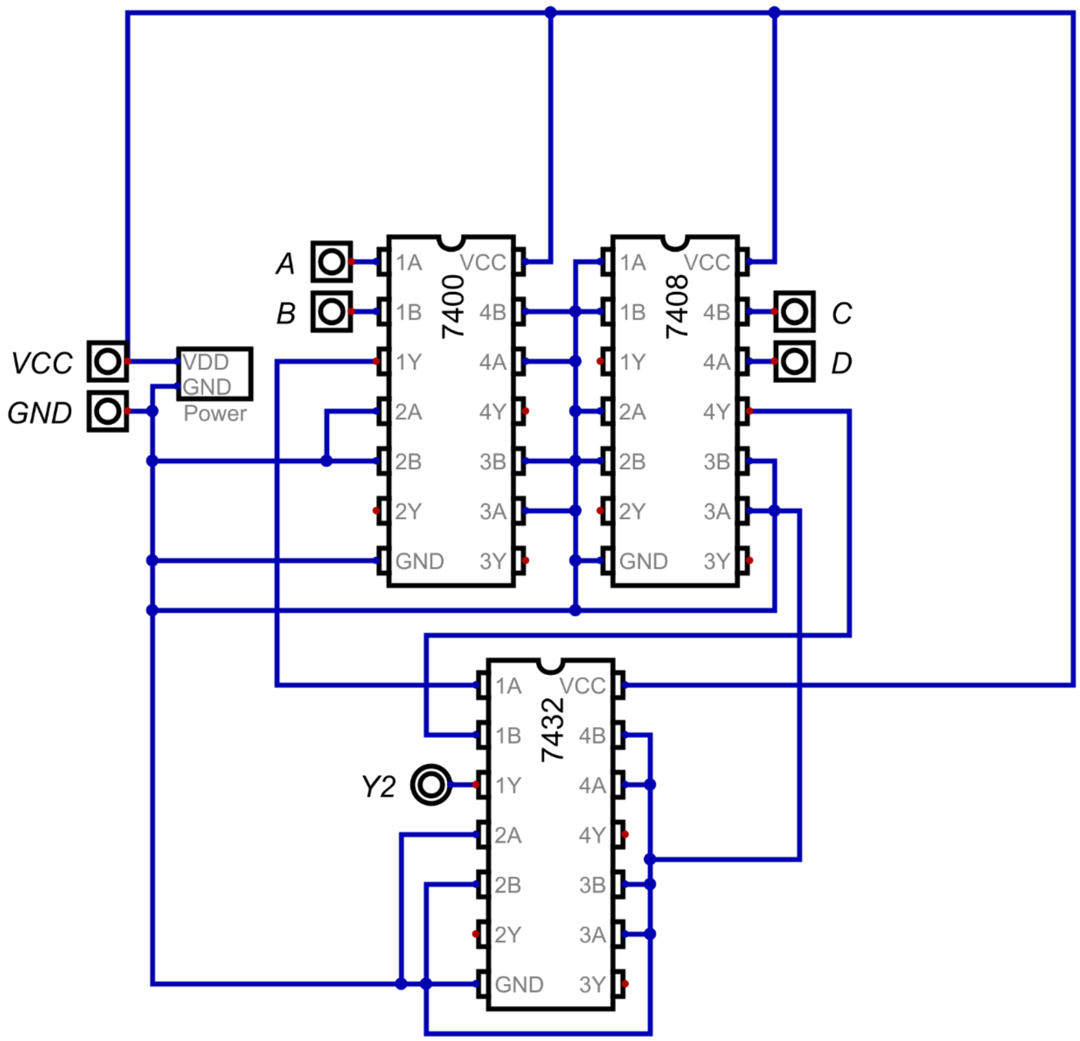
A	B	C	D	Y1
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

$$Y1 = \bar{A} \vee \bar{B} \vee \bar{C} \vee \bar{D}$$

A, B, C, and D must all be turned on for the output to be turned off.

$Y = \sim(A \bullet B) + C \bullet D$

NAND OR AND



Truth Table:

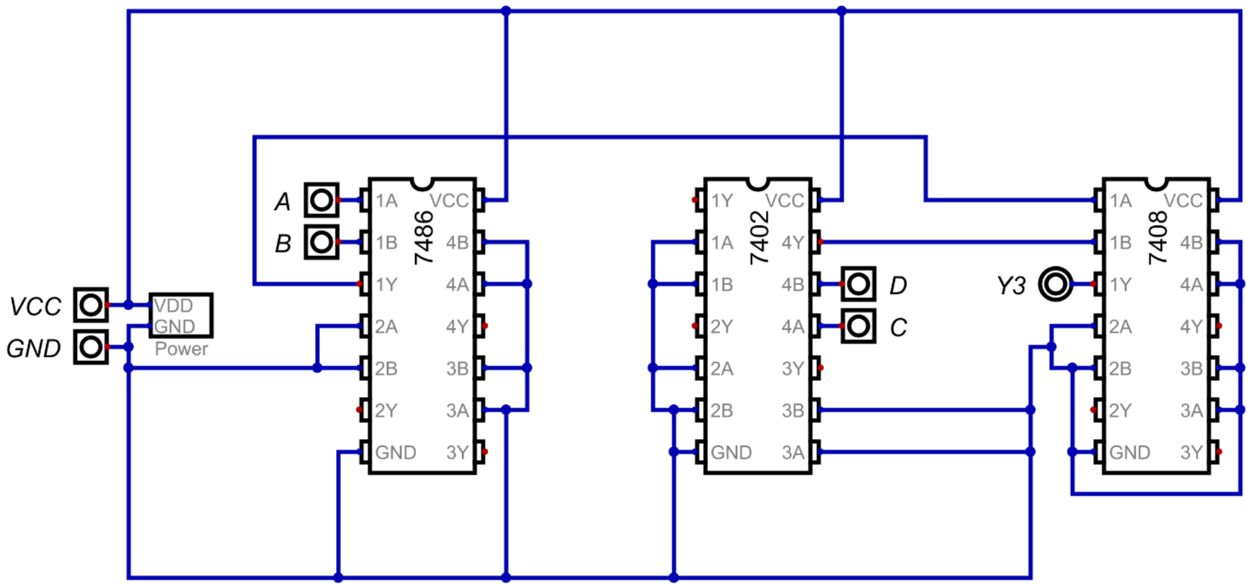
A	B	C	D	Y2
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	1

$$Y2 = \bar{A} \lor \bar{B} \lor (C \land D)$$

A and B must be turned on to turn off the output. However, if C and D is turned on, A and B will make no difference, causing the output to stay on.

Y = (A ⊕ B) • ~(C + D)

XOR NOR AND



Truth Table:

A	B	D	C	Y3
0	0	0	0	0
0	0	0	1	0
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	1
1	0	0	1	0
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

$$Y3 = (\overline{A} \wedge B \wedge \overline{C} \wedge \overline{D}) \vee (A \wedge \overline{B} \wedge \overline{C} \wedge \overline{D})$$

Turning on either A or B will turn on the output. However, both cannot be on at the same time, or the output will remain off.

Furthermore, if either A or B turns on the output, turning on either C or D will shut down the output.