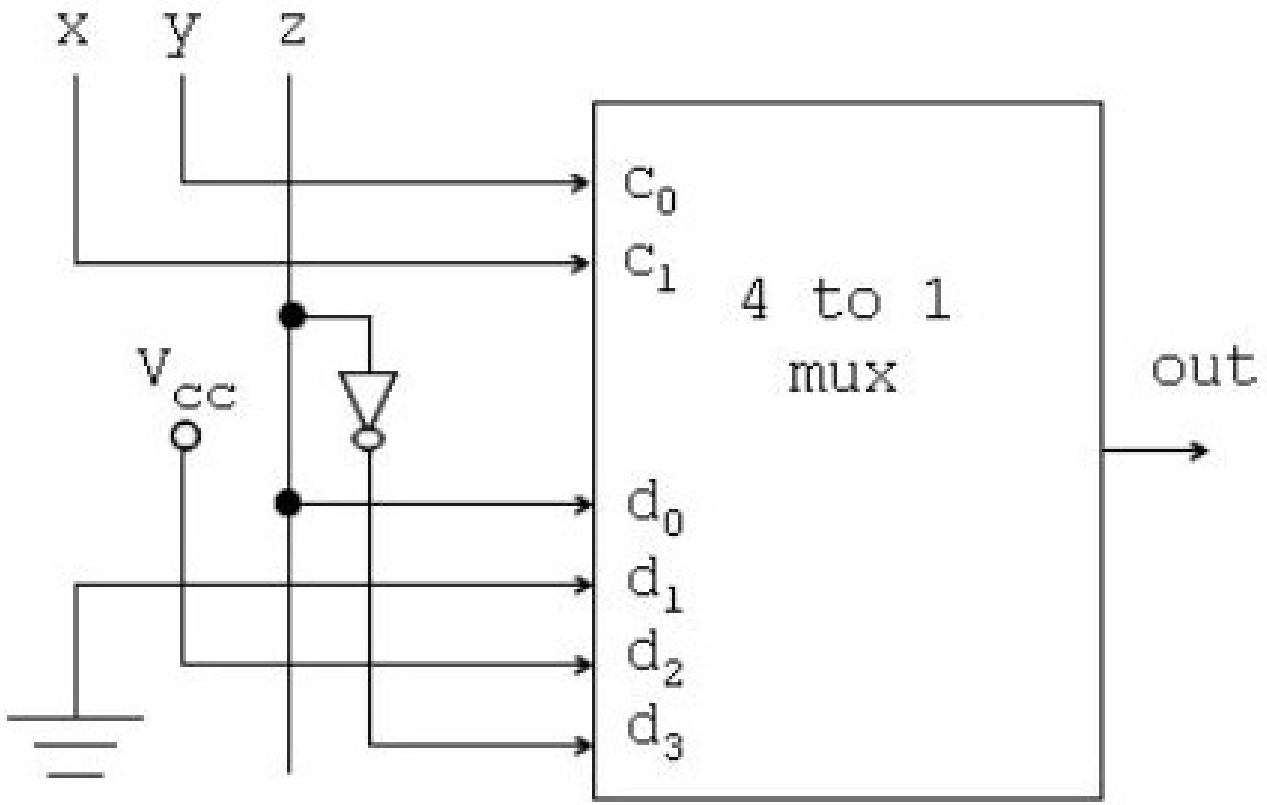
# KARMA NOTLAR

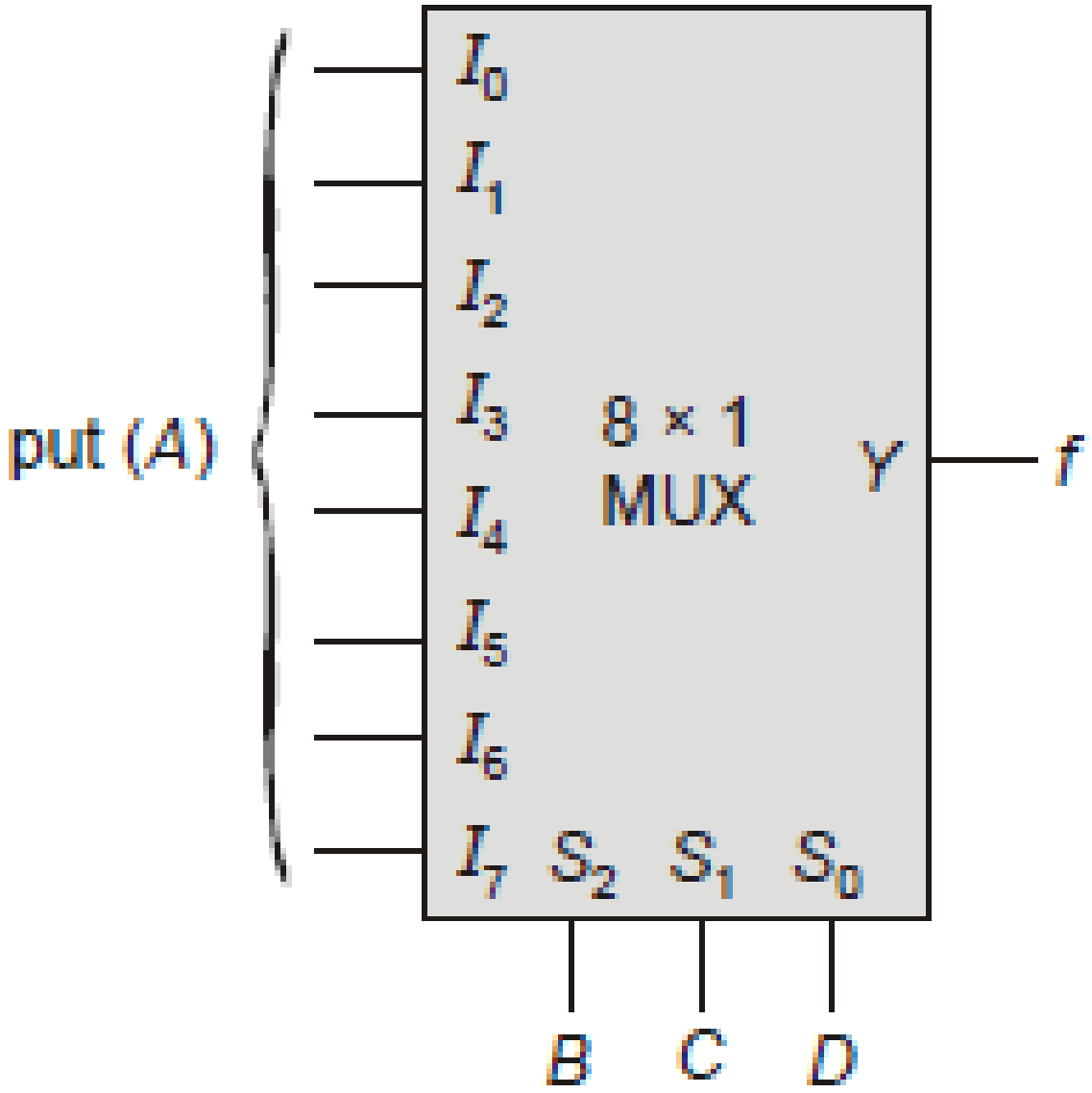
| A | B | C | D | AB | CD | Y |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 | 1 |

$$Y=AB+CD$$

$$G(x,y,z) = m(\ 1,\ 4,\ 5,\ 6\ )$$

| x | y | z | G | |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | G = z |
| 0 | 0 | 1 | 1 | |
| 0 | 1 | 0 | 0 | G = 0 |
| 0 | 1 | 1 | 0 | |
| 1 | 0 | 0 | 1 | G = 1 |
| 1 | 0 | 1 | 1 | |
| 1 | 1 | 0 | 1 | G = ~z |
| 1 | 1 | 1 | 0 | |



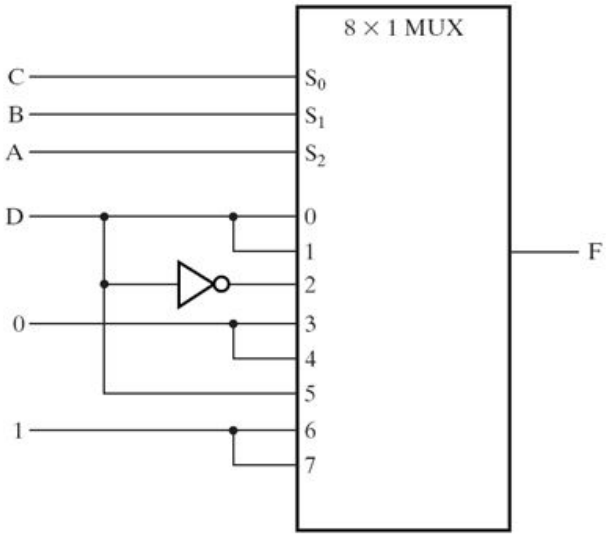

put (A)
$I_0$
$I_1$
$I_2$
$I_3$
$I_4$
$I_5$
$I_6$
$I_7$
8 × 1
MUX
Y
f
$S_2$
$S_1$
$S_0$
B
C
D

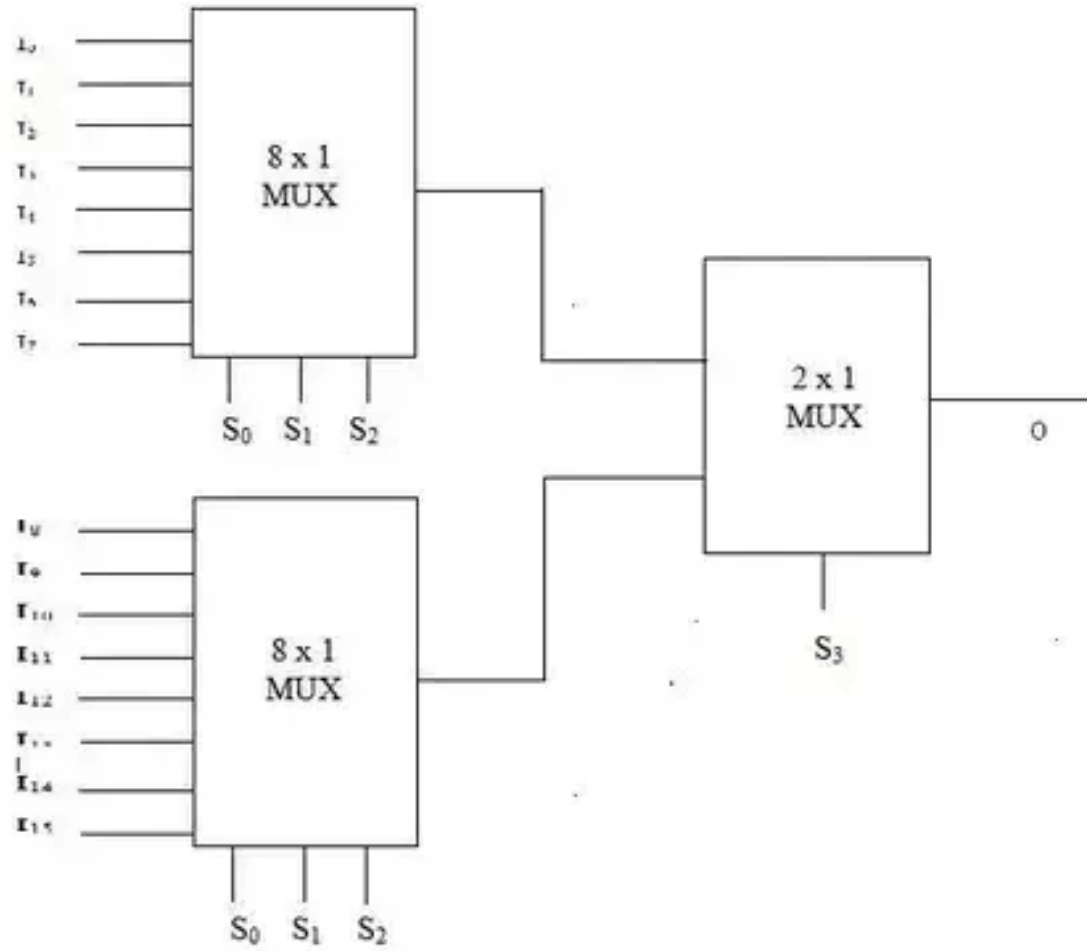
# Implementing Functions using Multiplexers

❖ Example: F (A,B,C,D) = Σm(1,3,4,11,12,13,14,15)

→16 rows in truth table
→ 16-to-1 MUX (conventional approach)
→But using the efficient approach … will use only an 8-to-1 MUX + 1 inverter

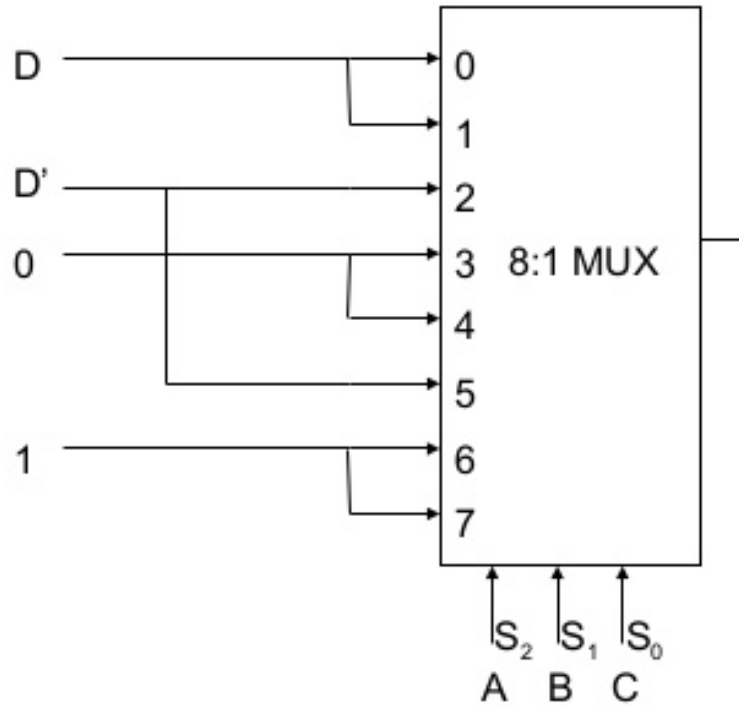
| A | B | C | D | F | |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | F = D |
| 0 | 0 | 0 | 1 | 1 | |
| 0 | 0 | 1 | 0 | 0 | F = D |
| 0 | 0 | 1 | 1 | 1 | |
| 0 | 1 | 0 | 0 | 1 | F = $\overline{D}$ |
| 0 | 1 | 0 | 1 | 0 | |
| 0 | 1 | 1 | 0 | 0 | F = 0 |
| 0 | 1 | 1 | 1 | 0 | |
| 1 | 0 | 0 | 0 | 0 | F = 0 |
| 1 | 0 | 0 | 1 | 0 | |
| 1 | 0 | 1 | 0 | 0 | F = D |
| 1 | 0 | 1 | 1 | 1 | |
| 1 | 1 | 0 | 0 | 1 | F = 1 |
| 1 | 1 | 0 | 1 | 1 | |
| 1 | 1 | 1 | 0 | 1 | F = 1 |
| 1 | 1 | 1 | 1 | 1 | |



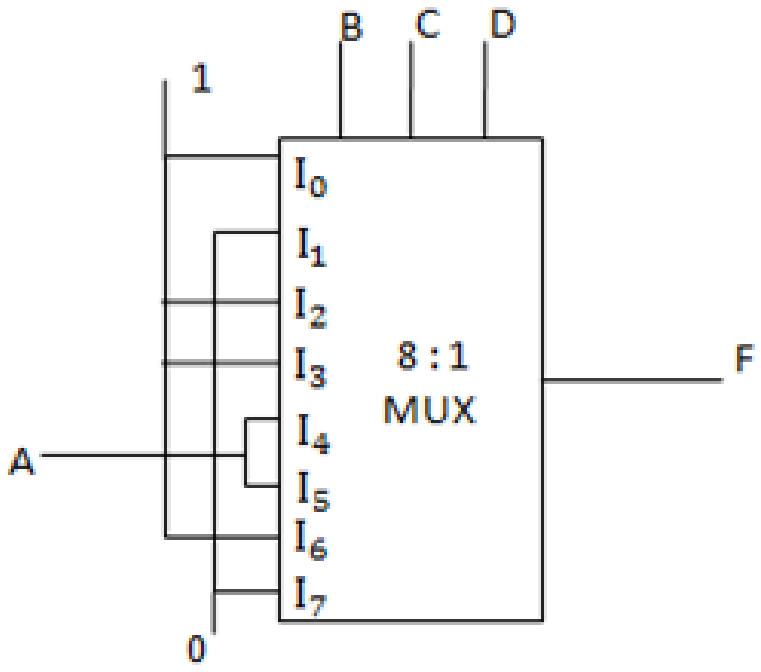

8 x 1
MUX
S0 S1 S2
8 x 1
MUX
S0 S1 S2
2 x 1
MUX
S3
O

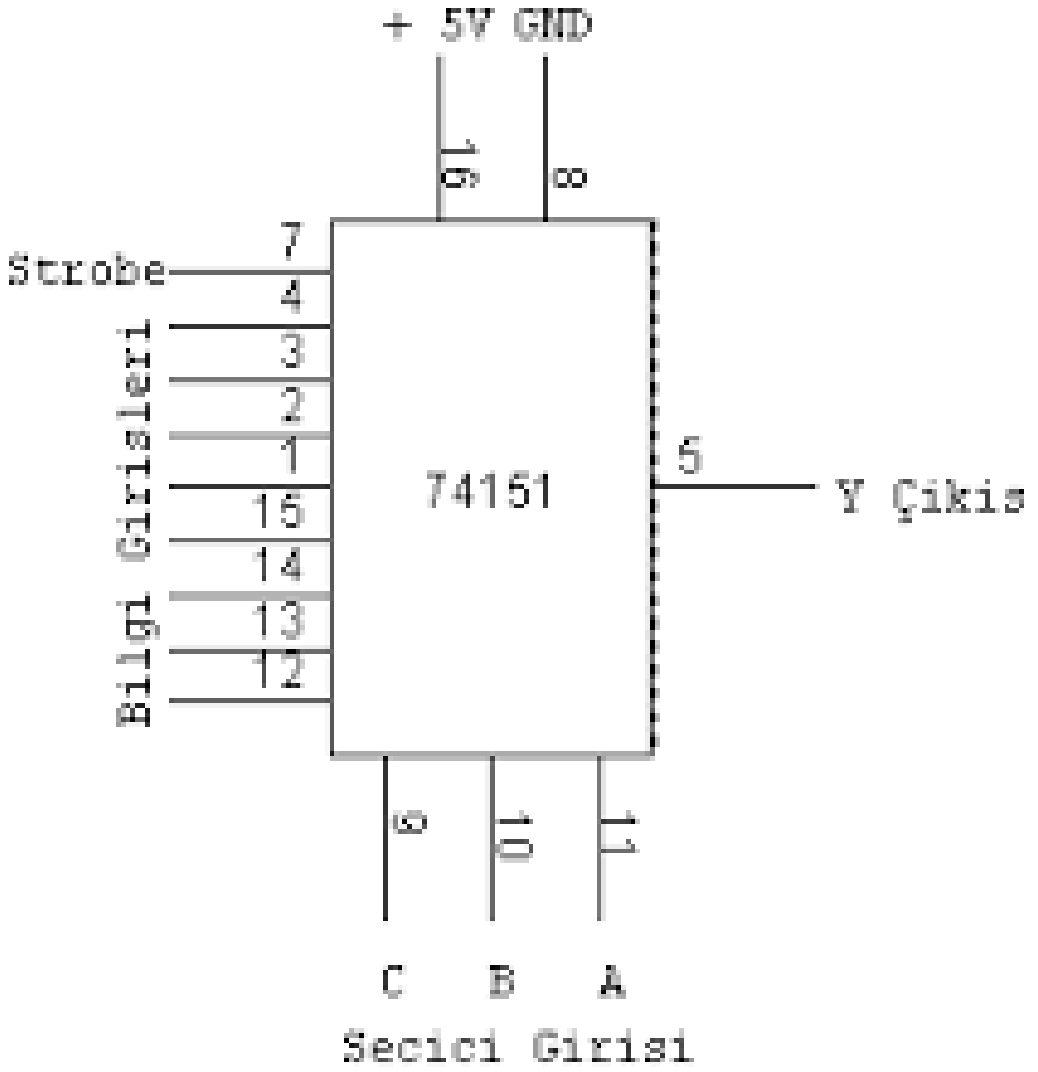
f(a, b, c) = F=A’B’C’D + A’B’CD + A’BC’D’ + AB’CD + ABC’D’ + ABC’D + ABCD’ +ABCD

| A | B | C | D | O | F |
|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | D |
| 0 | 0 | 0 | 1 | 1 | |
| 0 | 0 | 1 | 0 | 0 | D |
| 0 | 0 | 1 | 1 | 1 | |
| 0 | 1 | 0 | 0 | 1 | D’ |
| 0 | 1 | 0 | 1 | 0 | |
| 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 1 | 0 | |
| 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | |
| 1 | 0 | 1 | 0 | 0 | D’ |
| 1 | 0 | 1 | 1 | 1 | |
| 1 | 1 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 | 1 | |
| 1 | 1 | 1 | 0 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 | |



| | $I_0$ | $I_1$ | $I_2$ | $I_3$ | $I_4$ | $I_5$ | $I_6$ | $I_7$ |
|---|---|---|---|---|---|---|---|---|
| $\overline{A}$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| A | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | 1 | 0 | 1 | 1 | A | A | 1 | 0 |



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