

The Interdisciplinary Center, Herzeliya
Digital Architecture Course

Exercise 2

- Remember to implement the truth tables in the following order :
 - Variables alphabetically from left to right
 - Numerically (values) from top to bottom
1. (20 pts) Implement the following functions using a $3 \rightarrow 8$ decoder and gates of only two inputs:
 - a) $F(X,Y,Z) = X \cdot Y \cdot Z + X' \cdot Y' \cdot Z + X \cdot Y' \cdot Z$ (with OR gates)
 - b) $F = A \cdot B + A' \cdot C = A \cdot B \cdot C + A \cdot B \cdot C' + A' \cdot B \cdot C + A' \cdot B' \cdot C$
 2. (20 pts) Implement the following function in a minimal way with one $3 \rightarrow 8$ decoder and NAND gates:
 $F(a,b,c,d) = (A \cdot B' \cdot C + D') \cdot D + A \cdot B' \cdot C + A' \cdot B \cdot C'$
hint: simplify F first
 3. (20 pts) Implement a $4 \rightarrow 16$ decoder using two $2 \rightarrow 4$ decoders and logic gates. (without Enabler)
 4. (20 pts) Implement the equations from question 1 using only a $8 \rightarrow 1$ Mux.
 5. (20 pts) Implement the following functions using a $8 \rightarrow 1$ Mux and NOT gate (if needed):
 - a) $F = X' \cdot Y' + X \cdot Z' \cdot W'$ (use table X\YZW)
 - b) $F = X \cdot Y \cdot Z' + X' \cdot Z \cdot W + Y' \cdot Z' \cdot W'$ (use table X\YZW)