



Course: Digital Engineering Semester: 1 st term 2025/2026.	Lecturers: Dr. Osama Elnahas, Dr. Dina Abdelhafiz, Dr. Bassant Tolba, Dr. Radwa Rady Assistant: Eng. Rania Helal, Eng. Assma, Eng. Israa Mohsen, Eng. Hazem, Eng. Belal,
Tutorial 2: Truth Tables	

Question 1: Write down the truth table for the following logic expression

a) $F = (A + B)' + A'.(C + B')$

Question 2: Write down the truth table for the following word expressions:

- Given a 3-bit input $N = ABC$, design a circuit that outputs $f = 1$ if N represents a prime number, otherwise $f = 0$.
- Given a 3-bit input $X = ABC$, design a circuit that outputs $f = 1$ when the number of 1s in the input is odd (odd parity checker).
- Given a 3-bit input $N = ABC$, design a circuit that outputs $f = 1$ if N is divisible by 3, otherwise $f = 0$.
- Design a 3-input circuit with inputs A, B, C that outputs $f = 1$ if at least two consecutive bits are 1s (example: 011).

Question 3: Find the Duals (dual of the inner expression X ; $+ \leftrightarrow \cdot$). Reminder: To form the dual F^d of an expression X , interchange $+$ and \cdot everywhere. Complements and variables remain unchanged; constants $0 \leftrightarrow 1$ if present.

a) $X = \overline{AB} + \overline{C}(E + \overline{D})$

b) $X = \overline{(A + B)(A + \overline{A}B)}$