The Interdisciplinary Center, Herzeliya
Digital Architecture Course

Exercise 1

- Remember to implement the truth tables in the following order :
  - Variables alphabetically from left to right
  - Numerically (values) from top to bottom

1. (40 pts) Prove the following identities in both ways:
   - Using the basic identities (write them in bracket)
   - Using a truth table

   a) (X+Y)(X+Y') = X
   b) (X+Y)' · (X'+Y')' = 0
   c) AB'+A'B'+B'C = B'
   d) X·Y+Y'·Z'+W·X·Z' = X·Y + Y'·Z'

2. (30 pts) Express the following functions in the canonic form of :
   - SOP (sum of products)
   - POS (product of sums)

   a) F = A'+B'·C
   b) F = (X·Y)' + X'·Z
   c) F = A·B·D + A·C' + C·D'

3. (20 pts) Implement the following functions, using a minimal number of two-input logic gates (simplify them if needed):

   a) A'· (B·C+B')+A'· (B+C)+B·C
   b) (A'+B) · B'+A'·C'+A

4. (10 pts) Implement the following function using two-input NAND gates only :

   Y = A·B + C·D