***EX***: Prove that :

F= ABC + ABC + ABC = A(B+C)

 = AC(B+B) + ABC

 = AC + ABC

 = A(C+BC)

 = A(C+B)

***EX***: Simplify :

 X = AB + ABC + AB + ABC

 = AB(1+C) + AB + ABC

 = AB + AB + ABC

 = B + ABC

 = B + BAC

 = B + AC

***EX***: In a 3-input cct. The output is (1) if the majority of input is (1) , and otherwise , it is zero. White the T.T. for this cct. :

 ABC Z

 000 0

 001 0

 010 0

 011 1

 100 0

 101 1

 110 1

 111 1

**Sum -of- product representation of logic function :**

 A SP expression is a product term or several product terms, logically added together e.g:

 F= A.B + ABC + BD + …….

 product

 (AND)

**Derivation of sp :**

 1-construct the T.T.

 2-construct a multiplication column of product of all inputs.

 3-the desired expression is the sum of the product of all terms in which the output is 1 .

***EX***: For the following T.T. , write the logic function using sp method :

 P terms AB Z

 00 1 AB

 01 0 AB Z = AB + AB

 10 0 AB

 11 1 AB

***EX***: For the following T.T. , write the logic function using sp method , then simplify it :

 ABC Z P terms min terms

 000 0 ABC m0

 ABC m1 001 0

 m2 ABC 010 0

 011 1 ABC m3

 100 0 ABC m4

 101 1 ABC m5

 110 1 ABC m6

 111 1 ABC m7

 Z = m3 + m5 + m6 + m7

 = ABC + ABC +ABC + ABC

 = BC(A + A) + ABC + ABC

 = BC + ABC + ABC

 = C(B+BA) +ABC = C(B+A) +ABC

 = CB + CA + ABC = CB + A(C+BC)

 = CB + A(C+B)

 = CB + AC +AB