Answer on Question #57238 – Math – Discrete Mathematics

1. Expand the following Boolean functions into their canonical form:

i. f(X,Y,Z)=XY+YZ+ X' Z+ X' Y'

ii. f(X,Y,Z)=XY+ X' Y' + X' YZ

Solution

i. $f(X,Y,Z) = XY + YZ + X'Z + X'Y' =$

$= XY(Z + Z') + (X + X')YZ + X'(Y + Y')Z + X'Y'(Z + Z') =$

$= XYZ + XYZ' + XYZ + X'YZ + X'YZ + X'YZ + X'Y'Z + X'Y'Z + X'Y'Z' =$

$= X'Y'Z' + X'Y'Z + X'YZ + XYZ' + XYZ =$

$= m_0 + m_1 + m_3 + m_6 + m_7 = \sum(0, 1, 3, 6, 7)$ (in sum-of-products canonical form).

ii. $f(X,Y,Z) = XY + X'Y' + X'YZ =$

$= XY(Z + Z') + X'Y'(Z + Z') + X'YZ =$

$= XYZ + XYZ' + X'Y'Z + X'Y'Z' + X'YZ =$

$= X'Y'Z' + X'Y'Z + X'YZ + XYZ' + XYZ =$

$= m_0 + m_1 + m_3 + m_6 + m_7 = \sum(0, 1, 3, 6, 7)$ (in sum-of-products canonical form).