Problem Sheet #8

Problem 8.1: *quine-mccluskey algorithm*   (5+3+2 = 10 points)

A Boolean function F is defined by the following sum of minterms:

$$F(X_4, X_3, X_2, X_1, X_0) = m_1 + m_5 + m_7 + m_8 + m_9 + m_{10} + m_{11} + m_{13} + m_{16} + m_{18} + m_{24} + m_{29}$$

a) Calculate the prime implicants of F.

b) Construct a prime implicant chart and determine the essential prime implicants. Determine a minimal set of prime implicants covering the function F?

c) Write the minimal boolean expression defining F in mathematical logic notation. What is the cost of the minimal boolean expression compared to the cost of the original expression?

For calculating the cost of a boolean expression, we only consider logical $\wedge$ and $\vee$ operations.