

### 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.