

### ICS 2020 Problem Sheet #7

**Problem 7.1:** *quine-mccluskey algorithm*

(4+4+2 = 10 points)

A Boolean function  $\varphi$  is defined using the following sum of minterms:

$$\varphi(A, B, C, D, E) = m_0 + m_2 + m_4 + m_6 + m_9 + m_{10} + m_{13} + m_{14} + m_{15} + m_{16} + m_{17} + m_{21} + m_{26} + m_{28} + m_{30} + m_{31}$$

- a) Calculate the prime implicants of  $\varphi$ .
- b) Construct the prime implicant chart and identify the essential prime implicants.
- c) Write out all minimal boolean expressions defining  $\varphi$  using the mathematical logic notation.