

### ICS Problem Sheet #7

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

(2+4+4 = 10 points)

A Boolean function  $\varphi$  is defined using the following expression:

$$\varphi(W, X, Y, Z) = (\neg W \wedge X \wedge Z) \vee (X \wedge Y \wedge Z) \vee (W \wedge \neg X) \vee (W \wedge Y)$$

- a) Write down the truth table for  $\varphi$  and identify the minterms of  $\varphi$ . Write an expression defining  $\varphi$  as a sum of minterms.
- b) Calculate the prime implicants of  $\varphi$ .
- c) Construct the prime implicant chart and identify a minimal expression defining  $\varphi$ .