

**CS220 Computer Architecture**  
**Digital Logic Design**  
**Practical 3**

The TkGate Logic Simulator under Linux is used to implement these practicals. Boot Linux, log in and launch TkGate. The material on which this lab is based was covered in lectures 4,5 and 6. Slides for these lectures are available on moodle.

**Part A**

(a) Plot the function  $f(A,B,C,D) = \sum m(0,4,5,8,9,10,12)$  on a k-map. You may need to draw a truth table first.

(b) Using the minimisation procedure on the k-map, write a minimal Sum-of-Products expression for the function  $f$  using AND, OR and NOT operators.

(c) Implement the function on the simulator and verify its behaviour against the K-map (or truth table) for the function.

**Part B**

(a) Draw a truth table for a 1-bit full adder circuit.

(b) Plot the sum and carry functions on separate k-maps.

(c) Design and construct a 1-bit full adder using only five two-input logic gates (either EXOR, OR, AND, NOT).

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Please save your work frequently.