Assignment 5

Due date: 20th September, 2013

Question 1
For each of the following diagrams

(a) determine if it is an Hasse diagram. If not, change it to become an Hasse diagram.
(b) draw the corresponding partial order relation digraph.
(c) find all the maximal, minimal, greatest and least elements.

Question 2
Define the relation \( \preceq \) on a Boolean algebra \( B \) by

\[
\forall x, y \in B, \quad x \preceq y \text{ if and only if } x \lor y = y
\]

Show that \( \preceq \) is a partial order relation on \( B \).

Question 3
Use a Karnaugh map to simplify \( F = (x'y'z)' \). Explain your work.

Question 4
Trace the following circuit from left to right. Write down the output of each logic gate.
Write down the truth table associated with this circuit using a header like

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>z</th>
<th>gate 1 output</th>
<th>gate 2 output</th>
<th>gate 3 output</th>
</tr>
</thead>
</table>

and determine the Boolean function $f(x, y, z)$ given by the table. What has to be done in order to get a minimal representation of $f$?