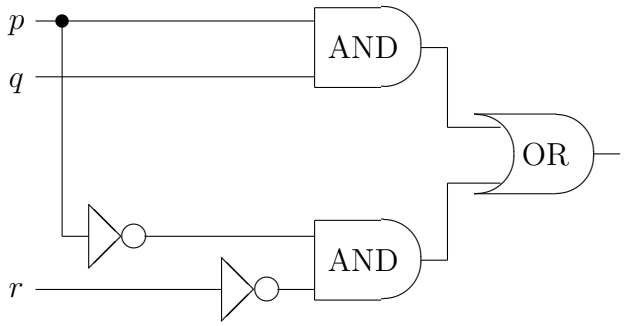
MAE113 DISCRETE TECHNIQUES FOR COMPUTING

Coursework 1–to be handed in by noon, Wednesday 06/10/2010.

Write your name and student number at the top of your assignment before handing it in. You should attempt all questions because only one question will be marked.

1. Draw logic circuits whose output is given by the following Boolean formulae:
   (a) $p'r \vee qr'$,
   (b) $p(q'r \vee pr')$.
2. Analyse the following logic circuit by
   (a) Giving the Boolean formula for the output,
   (b) Calculating its truth table.



3. Find a logic circuit *which uses only four logic gates in total* whose output is given by the Boolean formula $(p \vee q) \wedge (p' \vee q')$.
4. (a) Use truth tables to prove De Morgan's law: $(p \vee q)' \equiv p'q'$.
   (b) Use truth tables to prove the absorption law: $p \vee pq \equiv p$.
5. Find the Boolean formulae which describe the final two columns of the following truth table.

p	q	r	(a)	(b)
1	1	1	1	0
1	1	0	1	0
1	0	1	0	1
1	0	0	0	1
0	1	1	1	0
0	1	0	0	0
0	0	1	0	1
0	0	0	1	1