

## EC262 Problem Set 3 (Solutions)

**Due: Friday 31 August 2012**

Complete the following problems.

**Exercise 1:** Using a truth table to determine if  $f = g$ .

a.  $f = ac' + a'c + bc$  and  $g = (a + c)(a' + b + c')$ .

a	b	c	ac'	a'c	bc	f	(a + c)	(a' + b + c')	g
0	0	0	0	0	0	0	0	1	0
0	0	1	0	1	0	1	1	1	1
0	1	0	0	0	0	0	0	1	0
0	1	1	0	1	1	1	1	1	1
1	0	0	1	0	0	1	1	0	1
1	0	1	0	0	0	0	1	0	0
1	1	0	1	0	0	1	1	1	1
1	1	1	0	0	1	1	1	1	1

$f = g$

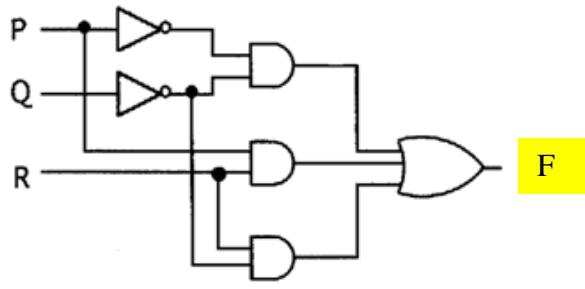
b.  $f = ab + ac + a'bd$  and  $g = bd + ab'c + abd'$

a	b	c	d	ab	ac	a'bd	f	bd	ab'c	abd'	g
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0
0	1	0	1	0	0	1	1	1	0	0	1
0	1	1	0	0	0	0	0	0	0	0	0
0	1	1	1	0	0	1	1	1	0	0	1
1	0	0	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0
1	0	1	0	0	0	1	1	0	1	0	1
1	0	1	1	0	0	1	1	0	0	0	1
1	1	0	0	1	0	0	1	0	1	0	1
1	1	0	1	1	0	0	1	0	0	1	1
1	1	1	0	1	1	0	1	1	0	0	1
1	1	1	1	1	1	0	1	0	0	0	1

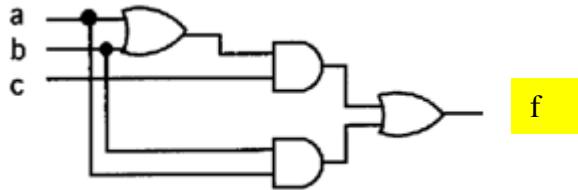
$f = g$

**Exercise 2:** Draw a digital circuit using AND, OR, and NOT gates to implement the following expressions.

a.  $F = P'Q' + PR + Q'R$

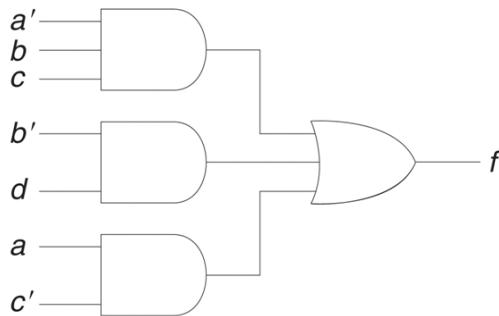


b.  $f = ab + c(a + b)$



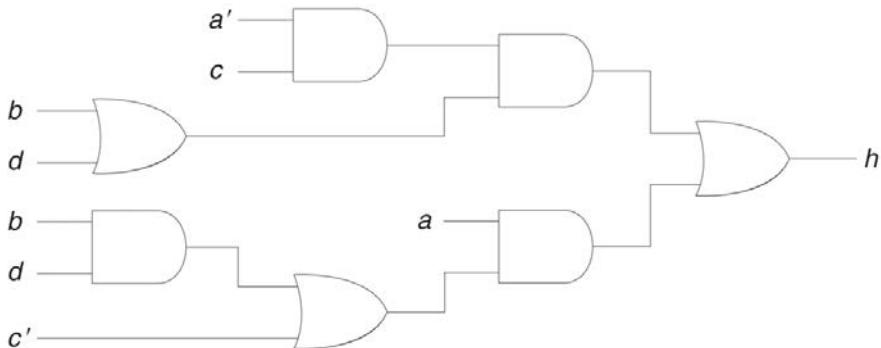
**Exercise 3:** Find a Boolean expression for the following circuits.

a.



$$f = a' b c + b' d + a c'$$

b.



$$h = a' c (b + d) + a (c' + b d)$$

**Exercise 4:** Construct Boolean expressions for f and g from the truth table below.

x	y	z	f	g
0	0	0	<b>0</b>	<b>1</b>
0	0	1	<b>1</b>	<b>0</b>
0	1	0	<b>0</b>	<b>1</b>
0	1	1	<b>1</b>	<b>0</b>
1	0	0	<b>0</b>	<b>1</b>
1	0	1	<b>0</b>	<b>0</b>
1	1	0	<b>1</b>	<b>1</b>
1	1	1	<b>0</b>	<b>0</b>

$$f = x' y' z + x' y z + x y z'$$

$$g = x' y' z' + x' y z' + x y' z' + x y z'$$