Module Title: Informatics 1 Computation and Logic 1
Exam Diet (Dec/April/Aug): Resit 2013
Brief notes on answers:

1. (a) The answer is "yes":

a	b	$(not(b)$	$a \rightarrow b$	$(not(b)\ and\ a \rightarrow b)$	$not(a)$	$(not(b)\ and\ a \rightarrow b) \rightarrow not(a)$
t	t	f	t	f	f	t
t	f	t	f	f	f	t
f	t	f	t	f	t	t
f	f	t	t	t	t	t

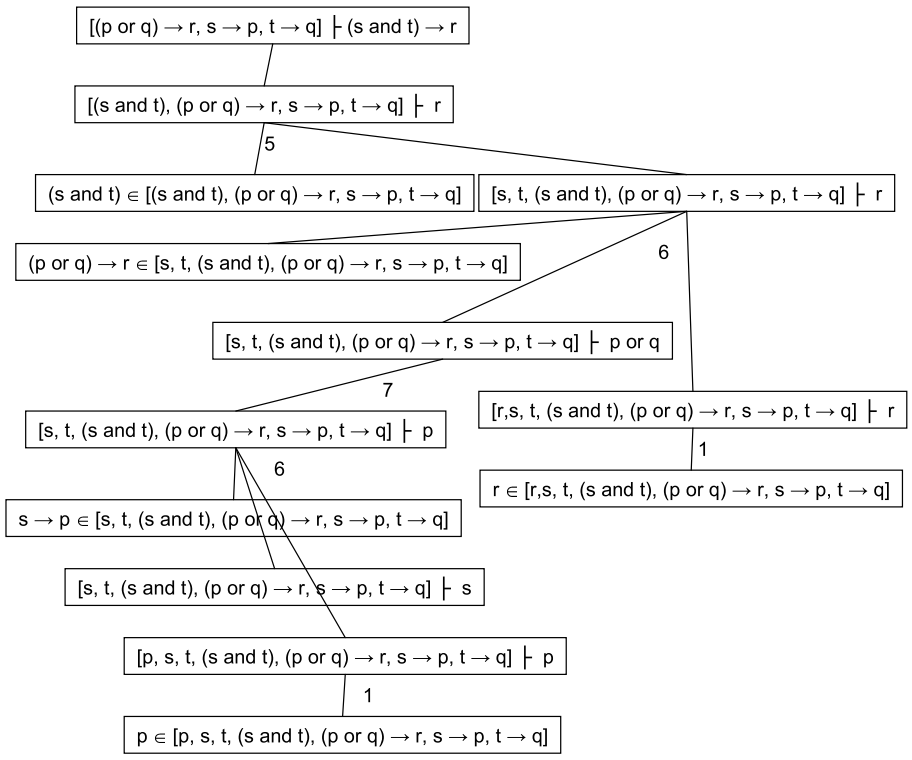
(b) The answer is "no":

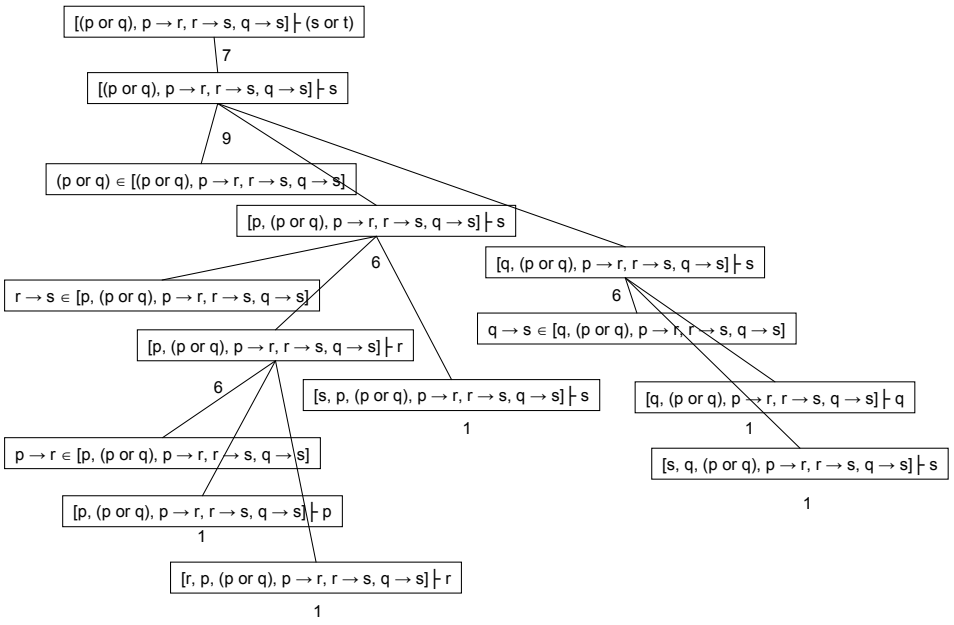
a	b	$(not(a)$	$a \rightarrow b$	$(not(a)\ and\ a \rightarrow b)$	$not(b)$	$(not(a)\ and\ a \rightarrow b) \rightarrow not(b)$
t	t	f	t	f	f	t
t	f	f	f	f	t	t
f	t	t	t	t	f	f
f	f	t	t	t	t	t

(c) The answer is "yes":

a	b	c	$not(a)$	$not(a)\ and\ c$	$b\ and\ c$	$a \rightarrow b$	$(a \rightarrow b)\ and\ c$	$(not(a)\ and\ c)\ or\ (b\ and\ c)$
t	t	t	f	f	t	t	t	t
t	t	f	f	f	f	t	f	f
t	f	t	f	f	f	f	f	f
f	t	t	t	t	t	t	t	t
f	t	f	t	f	f	t	f	f
f	f	t	t	t	f	t	t	t

2. The proof trees for this question are given below:



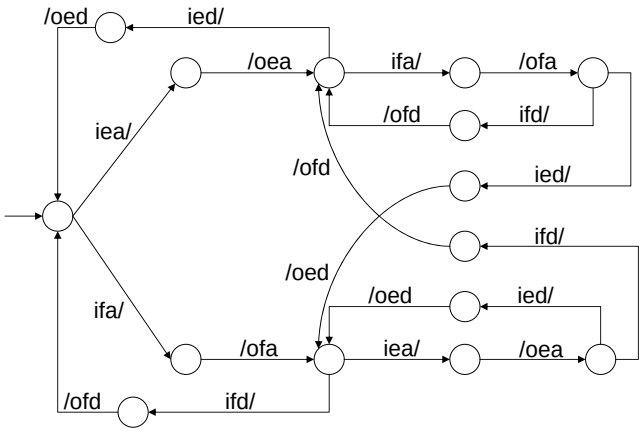


3. (a) A set of sets, where the outer set represents a conjunction and the elemental sets represent disjunctions. Each elemental set consists of propositions or their negations.

   (b) An appropriate proof is:

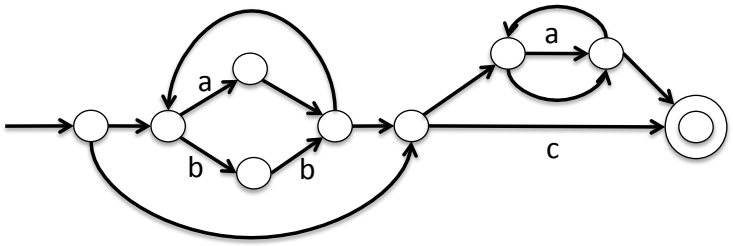
   - Negate d as the input clause $[not(d)]$
   - Resolve $[not(d)]$ with $[not(c), d]$ giving $[not(c)]$
   - Resolve $[not(c)]$ with $[not(a), not(b), c]$ giving $[not(a), not(b)]$
   - Resolve $[not(a), not(b)]$ with $[a]$ giving $[not(b)]$
   - Resolve $[not(b)]$ with $[b]$ giving $[]$
   - Hence $not(d)$ is contradictory
   - Hence d is true.

4. One possible FSM is given below:



iea = input signal from electrical monitor to activate warning
ifa = input signal from fuel monitor to activate warning
ied = input signal from electrical monitor to deactivate warning
ifd = input signal from electrical monitor to deactivate warning
oea = output signal to activate electrical fault warning light
ofa = output signal to activate fuel pump warning light
oed = output signal to deactivate electrical fault warning light
ofd = output signal to deactivate fuel pump warning light

5. An appropriate acceptor is:



6. An appropriate acceptor is: