

Review exercise - Solutions

Paper 1 style questions

1 a

p	q	$p \vee q$	$\neg(p \vee q)$	$\neg p$	$\neg q$	$\neg p \vee \neg q$	$\neg(p \vee q) \Rightarrow \neg p \vee \neg q$
T	T	T	F	F	F	F	T
T	F	T	F	F	T	F	T
F	T	T	F	T	F	F	T
F	F	F	T	T	T	T	T

Since every entry in the root column is T $\neg(p \vee q) \Rightarrow \neg p \vee \neg q$ is a valid argument.

b She does not dance well and she does not sing beautifully

2 a If the train leaves from gate 2, then it leaves today and not from gate 8.

b $\neg r \Leftrightarrow (p \vee q)$

3 a

p	q	$p \Rightarrow q$	$\neg p$	$\neg q$	$\neg q \vee p$	$\neg p \vee q$
T	T	T	F	F	T	T
T	F	F	F	T	T	F
F	T	T	T	F	F	T
F	F	T	T	T	T	T

b $(p \Rightarrow q) \Leftrightarrow (\neg p \vee q)$

4 a

p	q	$\neg p$	$\neg p \vee q$
T	T	F	T
T	F	F	F
F	T	T	T
F	F	T	T

b i If $x > 3$ and $x^2 \not> 9$, p is T and q is F. From the table $\neg p \vee q$ is F.

ii If $x \not> 3$ and $x^2 > 9$, p is F and q is T. From the table $\neg p \vee q$ is T.

6 a i Picasso painted picture A or van Gogh did not paint picture A.

ii Picasso did not paint picture A and van Gogh painted picture A.

b

p	q	$\neg p$	$\neg q$	$p \vee \neg q$	$\neg p \wedge q$
T	T	F	F	T	F
T	F	F	T	T	F
F	T	T	F	F	T
F	F	T	T	T	F

d i

$(p \vee \neg q)$	$(\neg p \wedge q)$	$(p \vee \neg q) \Leftrightarrow (\neg p \wedge q)$
T	F	F
T	F	F
F	T	F
T	F	F

e A logical contradiction.

7 a x is a multiple of 3 or a factor of 90 and is not a multiple of 5

b $r \Rightarrow (p \vee \neg q)$

c

p	q	r	$q \vee r$	$\neg p$	$(q \vee r) \wedge \neg p$
T	T	T	T	F	F
T	T	F	T	F	F
T	F	T	T	F	F
T	F	F	F	F	F
F	T	T	T	T	T
F	T	F	T	T	T
F	F	T	T	T	T
F	F	F	F	T	F

p	q	r	$\neg q$	$p \vee \neg q$	$r \Rightarrow (p \vee \neg q)$
T	T	T	F	T	T
T	T	F	F	T	T
T	F	T	T	T	T
T	F	F	T	T	T
F	T	T	F	F	F
F	T	F	F	F	T
F	F	T	T	T	T
F	F	F	T	T	T