

A. 1) $P \& \sim N$

2) $\sim P \& \sim N$ oppure $\sim (P \vee N)$

3) $(P \& N) \vee (N \& \sim P)$

4) $P \leftrightarrow \sim N$

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40

B. $(P \rightarrow (Q \& R)) \rightarrow (P \rightarrow R)$

1 $\sim((P \rightarrow (Q \& R)) \rightarrow (P \rightarrow R))$ ✓

2 $P \rightarrow (Q \& R)$ ✓

1 $\sim \rightarrow$

3 $\sim(P \rightarrow R)$ ✓

1 $\sim \rightarrow$

4 P

3 $\sim \rightarrow$

5 $\sim R$

3 $\sim \rightarrow$

6	$\sim P$	$2 \rightarrow$	$Q \& R$	$2 \rightarrow$
7	X	4, 6 $\sim$	Q	6 &
8			R	6 &
9		X	5, 8 $\sim$	

10

La fbf è tautologica

C. $\sim(P \vee Q), R \leftrightarrow P \vdash \sim R$

1 $\sim(P \vee Q)$ ✓

2 $R \leftrightarrow P$ ✓

3 $\sim \sim R$ ✓

4 R 3 $\sim \sim$

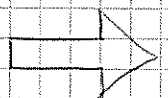
5 $\sim P$ 1 $\sim \vee$

6 $\sim Q$ 1 $\sim \vee$

7	R	$2 \leftrightarrow$	$\sim R$	$2 \leftrightarrow$
8	P	$2 \leftrightarrow$	$\sim P$	$2 \leftrightarrow$
9	X	5, 8 $\sim$	X	4, 7 $\sim$

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La forma argomentativa è valida



D. $P \rightarrow (Q \& R) \vdash (P \rightarrow R)$

1	$P \rightarrow (Q \& R)$	A
2	P	H (pcc $\rightarrow$ I)
3	$Q \& R$	1,2 $\rightarrow$ E
4	Q	3 $\&$ E
5	R	3 $\&$ E
6	$P \rightarrow R$	2-5 $\rightarrow$ I

10