

TUGAS 1

Proof that these below statement is Tautology

1. $p \rightarrow (p \vee q)$

$\neg p \vee (p \vee q)$ {p is always true}

p	q	$p \vee q$	$\neg p \vee (p \vee q)$
1	1	1	1
1	0	1	1
0	1	1	1
0	0	0	1

2. $\neg p \rightarrow (p \rightarrow q)$

$\neg p \rightarrow (\neg p \vee q)$

$p \vee (\neg p \vee q)$ {p is always true}

p	q	$\neg p \vee q$	$p \vee (\neg p \vee q)$
1	1	1	1
1	0	0	1
0	1	1	1
0	0	1	1

Proof that these below statements are Equivalent

1. $(p \rightarrow q) \wedge (p \rightarrow r) \equiv p \rightarrow (q \wedge r)$

$(\neg p \vee q) \wedge (\neg p \vee r) \equiv \neg p \vee (q \wedge r)$

$\neg p \vee (q \wedge r) \equiv \neg p \vee (q \wedge r)$ {Equivalent on both side}

p	q	r	$q \wedge r$	$\neg p \vee (q \wedge r)$
1	1	1	1	1
1	1	0	0	0
1	0	1	0	0
1	0	0	0	0
0	1	1	1	1
0	1	0	0	1
0	0	1	0	1
0	0	0	0	1

2. $(p \rightarrow r) \vee (q \rightarrow r) \equiv (p \wedge q) \rightarrow r$

$(\neg p \vee r) \vee (\neg q \vee r) \equiv \neg (p \wedge q) \vee r$

$(\neg p \vee \neg q) \vee r \equiv (\neg p \vee \neg q) \vee r$ {Equivalent on both side}

p	q	r	$\neg p \vee \neg q$	$(\neg p \vee \neg q) \vee r$
1	1	1	0	1
1	1	0	0	0
1	0	1	1	1
1	0	0	1	1
0	1	1	1	1
0	1	0	1	1
0	0	1	1	1
0	0	0	1	1