

Week-5

① $\neg(q \rightarrow r) \wedge (r \wedge (p \rightarrow q))$

\therefore It is a contradiction

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

③ $\neg p \rightarrow (p \rightarrow q)$

P	q	$\neg p$	$p \rightarrow q$	$\neg p \rightarrow (p \rightarrow q)$
T	T	F	T	T
T	F	F	F	T
F	T	T	T	T
F	F	T	T	T

Yes it is a tautology. Hence proved.

④ $(F \vee p) \rightarrow (q \wedge F)$

F	P	q	$F \vee p$	$q \wedge F$	$(F \vee p) \rightarrow (q \wedge F)$
F	T	T	T T	F	F F
F	T	F	T T	F	F F
F	F	T	F	F	T T
F	F	F	F	F	T T

It is not a contradiction