

Week 4

① (a)  $\neg(\neg p \vee \neg q)$

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

⑥  $\neg(\neg p \wedge \neg q)$

P	Q	$\neg p$	$\neg q$	$\neg p \wedge \neg q$	$\neg(\neg p \wedge \neg q)$
T	T	F	F	F	T
T	F	F	T	F	T
F	T	T	F	F	T
F	F	T	T	T	F

②  $P \rightarrow ((P \rightarrow (Q \rightarrow P)) \rightarrow P)$

P	Q	$Q \rightarrow P$	$P \rightarrow (Q \rightarrow P)$	$(P \rightarrow (Q \rightarrow P)) \rightarrow P$	$P \rightarrow ((P \rightarrow (Q \rightarrow P)) \rightarrow P)$
T	T	T	T	T	T
T	F	T	T	T	T
F	T	F	T	F	T
F	F	T	T	F	T

④  $(P \rightarrow Q) \vee (\neg P \rightarrow Q)$

P	Q	$P \rightarrow Q$	$\neg P$	$\neg P \rightarrow Q$	$(P \rightarrow Q) \vee (\neg P \rightarrow Q)$
T	T	T	F	T	T
T	F	F	F	T	T
F	T	T	T	T	T
F	F	T	T	F	T

③ (a) If P is prime, then  $\sqrt{P}$  is irrational

Converse: If  $\sqrt{P}$  is ~~prime~~ irrational then P is prime

Inverse: If P is not prime then  $\sqrt{P}$  is not irrational

contrapositive: If  $\sqrt{P}$  is not irrational then P is not prime

(b) If it is raining, then there are clouds in the sky

Converse: If there are clouds in the sky then it is raining.

Inverse: If it is not raining then there are no clouds in the sky.

Contrapositive: If there are no clouds in the sky, then it is ~~not~~ not raining