> 本部分知识点我觉得不易理解，故完成了全部四道题，如助教能拨冗批阅全部四道题，我能够对照更好的掌握知识点与复习我将不胜感激！

T1

1.
$$\begin{aligned}&\neg P \Rightarrow \neg(P \Rightarrow Q)\\ \equiv\ &(P \vee \neg(\neg P \vee Q))\\ \equiv\ &P \vee (P \wedge Q)\\ \equiv\ &P\end{aligned}$$

2.
$$\begin{aligned}&(\neg P \vee \neg Q) \Rightarrow (P \iff \neg Q)\\ \equiv\ &\neg(\neg P \vee \neg Q) \vee ((P \Rightarrow \neg Q) \wedge (\neg Q \Rightarrow P))\\ \equiv\ &(P \wedge Q) \vee ((\neg P \vee \neg Q) \wedge (Q \vee P))\\ \equiv\ &(P \wedge Q) \vee (\neg P \wedge Q) \vee (P \wedge \neg Q)\\ \equiv\ &\neg(\neg P \wedge \neg Q)\\ \equiv\ &P \vee Q\end{aligned}$$

3.
$$\begin{aligned}&(\neg P \Rightarrow \neg Q) \Rightarrow (P \Rightarrow Q)\\ \equiv\ &\neg(P \vee \neg Q) \vee (\neg P \vee Q)\\ \equiv\ &(\neg P \wedge Q) \vee (\neg P \vee Q)\\ \equiv\ &(\neg P \vee Q \vee \neg P) \wedge (\neg P \vee Q \vee Q)\\ \equiv\ &\neg P \vee Q\end{aligned}$$

4.
$$\begin{aligned}&(P \wedge \neg Q \wedge S) \vee (\neg P \wedge Q \wedge R)\\ \equiv\ &(P \vee Q) \wedge (P \vee R) \wedge (\neg Q \vee \neg P) \wedge (\neg Q \vee R) \wedge (S \vee \neg P) \wedge (S \vee Q) \wedge (S \vee R)\end{aligned}$$

T3

“今天上人智课” = α，“在澜园吃午饭” = β,

“在一教上课” $= x$，“在12点后吃午饭”$= y$，“在清芬园吃午饭” = z，“清芬园人多” = w

知识库KB：$(\alpha \Rightarrow x) \wedge (\alpha \Rightarrow y) \wedge (x \Rightarrow (\beta \vee z)) \wedge (y \Rightarrow w) \wedge (w \Rightarrow \neg z)$

试证明：$\alpha \Rightarrow \beta$

$$
\begin{array}{ll}
\alpha \Rightarrow x & \text{前提引入} \\
\alpha & \text{前提引入} \\
x & \text{假言推理} \\
\\
\alpha \Rightarrow y & \text{前提引入} \\
\alpha & \text{前提引入} \\
y & \text{假言推理} \\
\\
x \Rightarrow (\beta \vee z) & \text{前提引入} \\
x & \text{前提引入} \\
\beta \vee z & \text{假言推理} \\
\\
y \Rightarrow w & \text{前提引入} \\
y & \text{前提引入} \\
w & \text{假言推理} \\
\\
w \Rightarrow \neg z & \text{前提引入} \\
w & \text{前提引入} \\
\neg z & \text{假言推理} \\
\\
\beta \vee z & \text{前提引入} \\
\neg z & \text{前提引入} \\
\beta & \text{假言推理} \\
\\
\therefore \alpha \Rightarrow \beta & \text{证毕}
\end{array}
$$

T2

1. $$
\begin{aligned}
A \Rightarrow B &\equiv \neg A \vee B \\
\therefore (A \Rightarrow B) \wedge \neg B &\equiv (\neg A \vee B) \wedge \neg B \\
&\equiv \neg A \vee (B \wedge \neg B) \\
&\equiv \neg A \\
\therefore ((A \Rightarrow B) \wedge \neg B \Rightarrow \neg A) &= True
\end{aligned}
$$

2. $$
\begin{aligned}
((A \iff B) \wedge (B \iff C)) &\equiv ((A \Rightarrow B) \wedge (B \Rightarrow A) \wedge (B \Rightarrow C) \wedge (C \Rightarrow B)) \\
&\equiv (A \Rightarrow C) \wedge (C \Rightarrow A) \\
&\equiv A \iff C \\
\therefore (((A \iff B) \wedge (B \iff C)) \Rightarrow (A \iff C)) &= True
\end{aligned}
$$

3. $$
\begin{aligned}
& A \Rightarrow B\; and\; B \Rightarrow C: \\
& \qquad if\; A = 0: \\
& \qquad\qquad A \Rightarrow C \\
& \qquad elif\; A = 1: \\
& \qquad\qquad \because A \Rightarrow B \therefore B = 1 \\
& \qquad\qquad \because B \Rightarrow C \therefore C = 1 \\
& \qquad\qquad \therefore A \Rightarrow C \\
& \therefore (((A \Rightarrow B) \wedge (B \Rightarrow C)) \Rightarrow (A \Rightarrow C)) = True
\end{aligned}
$$

4.

$$
\begin{aligned}
&((A \Rightarrow B) \wedge (C \Rightarrow D) \wedge (\neg B \vee \neg D)) \Rightarrow (\neg A \vee \neg C)\\
\equiv\ &((A \Rightarrow B) \wedge (C \Rightarrow D) \wedge (B \Rightarrow \neg D)) \Rightarrow (A \Rightarrow \neg C)\\
\equiv\ &((A \Rightarrow \neg D) \wedge (C \Rightarrow D)) \Rightarrow (A \Rightarrow \neg C)\\
\equiv\ &((\neg A \vee \neg D) \wedge (\neg C \vee D)) \Rightarrow (\neg A \vee \neg C)\\
\equiv\ &((\neg A \wedge \neg C) \vee (\neg A \wedge D) \vee (\neg C \wedge \neg D) \vee False) \Rightarrow (\neg A \vee \neg C)\\
\equiv\ &((\neg C \wedge \neg D) \vee (\neg A \wedge D)) \Rightarrow (\neg A \vee \neg C)\\
\equiv\ &True
\end{aligned}
$$

T4

$$
\begin{aligned}
&KB \wedge \neg\alpha\\
&(A \Rightarrow C) \vee (B \Rightarrow C) \wedge \neg(A \vee B \Rightarrow C)\\
\equiv\ &((\neg A \vee C) \vee (\neg B \vee C)) \wedge \neg((\neg A \wedge \neg B) \vee C)\\
\equiv\ &((\neg A \vee C) \vee (\neg B \vee C)) \wedge ((A \vee B) \wedge \neg C)\\
\equiv\ &(\neg A \vee C \vee \neg B) \wedge ((A \wedge \neg C) \vee (B \wedge \neg C))\\
\equiv\ &\neg B \vee (B \wedge \neg C)\\
\equiv\ &\neg B \vee \neg C\\
\neq\ &False\\
\therefore\ &KB \Rightarrow \alpha\text{不成立}
\end{aligned}
$$