1) $\models \mathcal{U}$ iff $\neg\mathcal{U}$ inconsistent
2) $\not\models \mathcal{U}$ then $\mathcal{F}_{i,j}(\mathcal{U}) = F$
3) an open branch of semi-tableau of $\mathcal{U}$ provides a model of $\mathcal{U}$.
4) an open branch of semi-tableau of $\neg\mathcal{U}$ provides an anti-model of $\mathcal{U}$

$\mathcal{U} \models \mathcal{V}$ iff $\mathcal{U} \wedge \neg\mathcal{V}$ is inconsistent

1) iff $\mathcal{U} \wedge \neg\mathcal{V}$ has a closed semi-tableau
2) iff $CNF(\mathcal{U} \wedge \neg\mathcal{V}) \vdash_{\text{Res}} \square$
   $\{\mathcal{U}^{cs}, \mathcal{C}(\mathcal{V})^{cs}\} \vdash_{\text{Res}} \square$
3) $\mathcal{U}_1, \mathcal{U}_2, \ldots \mathcal{U}_n \vdash \mathcal{V}$
4) $\vdash \mathcal{U} \rightarrow \mathcal{V}$

(9.1) $p \rightarrow q, r \rightarrow t, p \vee r, \neg q \vdash t$ (f_1 f_2 f_3 f_4 c)

$f_3 \equiv p \vee r = \neg p \rightarrow r$
$f_1, f_4 \vdash_{mt} \neg p : f_5$
$f_5, f_3 \vdash_{mp} r : f_6$
$f_6, f_2 \vdash_{mp} t f_7 C$

(10.1) if $\vdash p \vee (q \rightarrow r) \rightarrow ((p \vee q) \rightarrow (p \vee r))$

(A) reverse t. of deduction.

then $p \vee q \rightarrow r \vdash (p \vee q) \rightarrow (p \vee r)$

$\neg p \rightarrow (q \rightarrow r) \vdash (\neg p \rightarrow q) \Rightarrow (\neg p \rightarrow r)$

then $\neg p \rightarrow q \rightarrow r, \neg p \rightarrow q \vdash \neg p \rightarrow r$

then $\neg p \rightarrow (q \rightarrow r), \neg p \rightarrow q, \neg p \vdash r$ (*) (f_1 f_2 f_3)

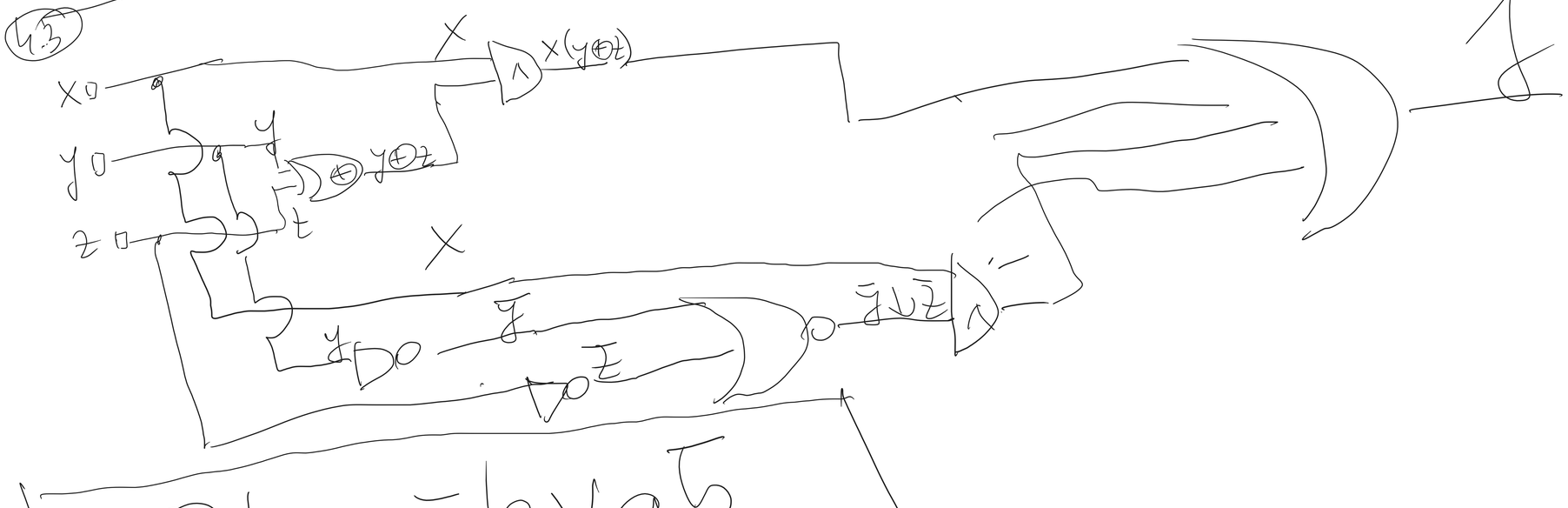
(2) Prove (*)

$f_1, f_2 \vdash_{mp} q \rightarrow r : f_4$
$f_2, f_3 \vdash_{mp} q : f_5$
$f_5, f_4 \vdash_{mp} r$

Deduction theorem: if $\mathcal{U}_1, \mathcal{U}_2, \ldots \mathcal{U}_{n-1}, \mathcal{U}_n \vdash \mathcal{V}$ then $\mathcal{U}_1, \mathcal{U}_2, \ldots \mathcal{U}_{n-1} \vdash \mathcal{U}_n \rightarrow \mathcal{V}$

(3) if $\neg p \rightarrow (q \rightarrow r), \neg p \rightarrow q, \neg p \vdash r$ then
$\neg p \rightarrow (q \rightarrow r), \neg p \rightarrow q \vdash \neg p \rightarrow r$ then
$\neg p \rightarrow (q \rightarrow r) \vdash (\neg p \rightarrow q) \rightarrow (\neg p \rightarrow r)$ then
$\vdash (\neg p \rightarrow (q \rightarrow r)) \rightarrow ((\neg p \rightarrow q) \rightarrow (\neg p \rightarrow r))$
$p \vee (q \rightarrow r)$ $p \vee q$ $p \vee r$

(4.3)



$a \oplus b = \bar{a}b \vee a\bar{b}$
$a \vee b = \overline{\bar{a} \vee b} = \bar{a}\bar{b}$

$f = x(\bar{y}z \vee y\bar{z}) \vee y(\bar{x}z \vee x\bar{z}) \vee xyz \vee \bar{x}\bar{y}\bar{z}$
$= x\bar{y}z \vee xy\bar{z} \vee \bar{x}yz \vee xyz \vee x\bar{y}\bar{z} \vee xyz \vee \bar{x}\bar{y}\bar{z}$
$= m_5 \vee m_6 \vee m_3 \vee m_6 \vee m_7 \vee m_0$
$= \sum m(0, 3, 5, 6, 7)$