Truth Definitions:

¬T: A negation of the form $\ulcorner\neg A\urcorner$ is true in an interpretation $\mathcal{I}$ just in case A is false in $\mathcal{I}$.

∧T: A conjunction of the form $\ulcorner(A \wedge B)\urcorner$ is true in an interpretation $\mathcal{I}$ just in case A is true in $\mathcal{I}$ and B is true in $\mathcal{I}$.

∨T: A disjunction of the form $\ulcorner(A \vee B)\urcorner$ is true in an interpretation $\mathcal{I}$ just in case either A is true in $\mathcal{I}$ or B is true in $\mathcal{I}$.

→T: A material conditional of the form $\ulcorner(A \rightarrow B)\urcorner$ is true in an interpretation $\mathcal{I}$ just in case either A is false in $\mathcal{I}$ or B is true in $\mathcal{I}$.

↔T: A material bi-conditional of the form $\ulcorner(A \leftrightarrow B)\urcorner$ is true in an interpretation $\mathcal{I}$ just in case either (A is true in $\mathcal{I}$ and B is true in $\mathcal{I}$) or (A is false in $\mathcal{I}$ and B is false in $\mathcal{I}$).

Derivative Falsity Definitions:

¬F: A negation of the form $\ulcorner\neg A\urcorner$ is false in an interpretation $\mathcal{I}$ just in case A is true in $\mathcal{I}$.

∧F: A conjunction of the form $\ulcorner(A \wedge B)\urcorner$ is false in an interpretation $\mathcal{I}$ just in case either A is false in $\mathcal{I}$ or B is false in $\mathcal{I}$.

∨F: A disjunction of the form $\ulcorner(A \vee B)\urcorner$ is false in an interpretation $\mathcal{I}$ just in case both A is false in $\mathcal{I}$ and B is false in $\mathcal{I}$.

→F: A material conditional of the form $\ulcorner(A \rightarrow B)\urcorner$ is false in an interpretation $\mathcal{I}$ just in case A is true in $\mathcal{I}$ and B is false in $\mathcal{I}$.

↔F: A material bi-conditional of the form $\ulcorner(A \leftrightarrow B)\urcorner$ is false in an interpretation $\mathcal{I}$ just in case either (A is true in $\mathcal{I}$ and B is false in $\mathcal{I}$) or (A is false in $\mathcal{I}$ and B is true in $\mathcal{I}$).

Second Midterm Cheat sheet

Basic Inference Rules for $\mathcal{F}$

Hyp

$i.\ \mathsf{A}$

∧Elim

$i.\ \mathsf{A} \wedge \mathsf{B}$

$\triangleright\ j.\ \mathsf{A}/\mathsf{B}$ — **∧Elim:** i

∨Intro

$i.\ \mathsf{A}/\mathsf{B}$

$\triangleright\ j.\ \mathsf{A} \vee \mathsf{B}$ — **∨Intro:** i

¬Elim

$i.\ \neg\neg\mathsf{A}$

$\triangleright\ j.\ \mathsf{A}$ — **¬ Elim:** i

→Elim

$i.\ \mathsf{A} \rightarrow \mathsf{B}$

$j.\ \mathsf{A}$

$\triangleright\ k.\ \mathsf{B}$ — **→ Elim:** $i,\ j$

∧Intro

$i.\ \mathsf{A}$

$j.\ \mathsf{B}$

$\triangleright\ k.\ \mathsf{A} \wedge \mathsf{B}$ — **∧Intro:** i, j

↔Elim

$i.\ \mathsf{A} \leftrightarrow \mathsf{B}$

$j.\ \mathsf{A}/\mathsf{B}$

$\triangleright\ k.\ \mathsf{B}/\mathsf{A}$ — **↔Elim:** i, j

Conditional Inference Rules for $\mathcal{F}$

→Intro

$\quad i.\ \mathsf{A}$

$\quad \vdots$

$\quad j.\ \mathsf{B}$

$\triangleright\ k.\ \mathsf{A} \rightarrow \mathsf{B}$ — **→ Intro:** i,j

↔Intro

$\quad i.\ \mathsf{A}$

$\quad \vdots$

$\quad j.\ \mathsf{B}$

$\quad k.\ \mathsf{B}$

$\quad \vdots$

$\quad l.\ \mathsf{A}$

$\triangleright\ m.\ \mathsf{A} \leftrightarrow \mathsf{B}$ — **↔Intro:**$(i, j), (k, l)$