

ECM3404: Logic and Computation

Tutorial Questions

10th February 2009

1 Natural Deduction (Propositional Calculus, simple rules)

$$1. \left| \begin{array}{l} A \wedge B \\ C \wedge D \\ \hline A \wedge D \end{array} \right|$$

$$2. \left| \begin{array}{l} A \\ A \vee B \rightarrow C \\ \hline D \vee C \end{array} \right|$$

$$3. \left| \begin{array}{l} A \wedge C \\ A \rightarrow B \\ B \wedge C \rightarrow D \\ \hline D \end{array} \right|$$

$$4. \left| \begin{array}{l} A \wedge D \\ A \leftrightarrow C \\ B \leftrightarrow D \\ \hline B \wedge C \end{array} \right|$$

$$5. \left| \begin{array}{l} A \wedge B \\ B \rightarrow C \wedge E \\ A \wedge C \rightarrow D \\ \hline D \wedge E \end{array} \right|$$

Propositional Calculus: All Rules

$$6. \left| \begin{array}{l} A \rightarrow C \\ B \rightarrow D \\ \hline A \wedge B \rightarrow C \wedge D \end{array} \right|$$

$$7. \left| \begin{array}{l} A \rightarrow B \\ A \wedge B \rightarrow C \\ \hline A \rightarrow C \end{array} \right|$$

$$8. \left| \begin{array}{l} B \\ A \rightarrow (B \rightarrow C) \\ \hline A \rightarrow C \end{array} \right|$$

$$9. \left| \begin{array}{l} A \rightarrow (B \rightarrow C) \\ \hline B \rightarrow (A \rightarrow C) \end{array} \right|$$

10.
$$\frac{A \rightarrow C}{A \rightarrow (B \rightarrow C)}$$
11.
$$\frac{A \vee B \rightarrow C}{(A \rightarrow C) \wedge (B \rightarrow C)}$$
12.
$$\frac{\begin{array}{l} A \rightarrow B \\ B \rightarrow A \end{array}}{A \leftrightarrow B}$$
13.
$$\frac{A \rightarrow \neg A}{\neg A}$$
14.
$$\frac{\begin{array}{l} A \rightarrow B \wedge C \\ B \rightarrow D \\ \neg(B \wedge D) \end{array}}{\neg A}$$
15.
$$\frac{(A \rightarrow B) \vee C}{A \rightarrow (B \vee C)}$$
16.
$$\frac{\begin{array}{l} A \rightarrow B \vee C \\ B \rightarrow D \end{array}}{A \rightarrow C \vee D}$$
17.
$$\frac{\begin{array}{l} A \wedge B \rightarrow C \vee D \\ B \wedge C \rightarrow E \end{array}}{A \wedge B \rightarrow D \vee E}$$
18.
$$\frac{A \rightarrow \neg B \vee C}{A \wedge B \rightarrow C}$$