

RECITATION 1

1. SYLLABUS

- (1) Lectures are Tuesday and Thursday, GHC 4307, from 1:30-2:50.
- (2) Recitations are not required but strongly encouraged, taking place on Wednesdays.
- (3) Office hours
 - Jon Sterling: Monday 1:30pm-2:30pm, GHC 9225
 - Frank Pfenning: Wednesday, 1:30pm-2:30pm, GHC 7019
 - Ryan Kavanagh, Friday 11:30am-12:30pm, GHC 6207
 - Danny Gratzer, Sat 11:00am-2:00pm, Citadel Teaching Commons, GHC 5th floor
- (4) Course homework should be turned via autolab.
- (5) Course questions should be asked via Piazza (*Please do not email questions to TAs personally*)
- (6) Grades
 - 40% weekly homework, released Tuesday and due Tuesday with no late days.
 - 30% 2 closed-book, in-class midterms, the first being on Thursday September 28th and the second on Thursday, November 9th.
 - 30% the closed-book final.
- (7) Grading cut-offs will be no harsher than 90% for an A, 80% for a B, etc.
- (8) All of this and more may be found on the course website <http://www.cs.cmu.edu/~fp/courses/15317-f17/>

2. REVIEW OF THE RULES INTRODUCED IN CLASS

First let us recall the rules that were introduced in lecture.

$$\begin{array}{c}
 \frac{A \text{ true} \quad B \text{ true}}{A \wedge B \text{ true}} \quad \frac{A \text{ true}}{A \vee B \text{ true}} \quad \frac{B \text{ true}}{A \vee B \text{ true}} \quad \frac{A \wedge B \text{ true}}{A \text{ true}} \quad \frac{A \wedge B \text{ true}}{B \text{ true}} \quad \frac{\frac{A \text{ true}}{\vdots} \quad \frac{B \text{ true}}{A \supset B \text{ true}}}{A \supset B \text{ true}} \text{U} \\
 \\
 \frac{A \supset B \text{ true} \quad A \text{ true}}{B \text{ true}}
 \end{array}$$

3. EXAMPLE PROOFS

- (1) $(A \supset (B \supset C)) \supset (B \supset (A \supset C))$

$$\frac{\frac{\frac{A \supset (B \supset C)}{B \supset C}^a \quad \frac{A}{B}^c}{C} \quad \frac{A \supset C}{B \supset (A \supset C)}^b}{(A \supset B \supset C) \supset (B \supset (A \supset C))}^a$$

(2) $((A \wedge B) \supset C) \supset (A \supset (B \supset C))$

$$\frac{\frac{\frac{\overline{(A \wedge B) \supset C}^a}{C}}{B \supset C}}{A \supset (B \supset C)}^b \quad \frac{\frac{\overline{A}^b \quad \overline{B}^c}{A \wedge B}}{C}^c}{\overline{(A \wedge B) \supset C} \supset (A \supset (B \supset C))}^a$$

(3) $((A \wedge B) \wedge C) \supset (A \wedge (B \wedge C))$

$$\frac{\frac{\frac{\overline{(A \wedge B) \wedge C}^a}{A \wedge B}}{A}}{B \wedge C} \quad \frac{\frac{\overline{(A \wedge B) \wedge C}^a}{A \wedge B}}{B} \quad \frac{\overline{(A \wedge B) \wedge C}^a}{C}}{\overline{(A \wedge B) \wedge C} \supset (A \wedge (B \wedge C))}^a$$

(4) $(A \supset (B \wedge C)) \supset (A \supset B) \wedge (A \supset C)$

$$\frac{\frac{\frac{\overline{A \supset (B \wedge C)}^a}{B \wedge C}}{B}}{A \supset B}^b \quad \frac{\frac{\frac{\overline{A \supset (B \wedge C)}^a}{B \wedge C}}{C}}{A \supset C}^c}{\overline{A \supset (B \wedge C)} \supset (A \supset B) \wedge (A \supset C)}^a$$

(5) Why is this impossible with the rules we have? $(A \vee C) \wedge (B \vee C) \supset ((A \wedge B) \vee C)$