

Constructive Logic (15-317), Fall 2016

Recitation 14: Exam Review

Evan Cavallo (ecavallo@cs.cmu.edu), Oliver Daidis (ojd@andrew), Giselle Reis (greis@andrew)

The Exam

Welcome to the last recitation of Constructive Logic! There's only one last hurdle to get over: the final exam (and the homework, if we're being realistic).

To be clear, the final exam is **cumulative**. Nearly everything you've seen this semester could appear on the exam. This includes things as far back as natural deduction and harmony.

If you have questions about any of the topics covered so far, feel free to ask them now! If not, maybe the following questions will help inspire you.

Harmony

Task 1. What was the purpose of local soundness and completeness in our rules? What do these have to do with cut and identity?.

Task 2. Show that \oplus and \multimap are locally sound and complete.

Classical vs Constructive vs Linear

Each of these has a different notion of "truth". As we've seen, there are some statements that are provable in one but not the other.

Task 3. What rules could we add to our linear logic ruleset to make it equivalent to the one we had for sequent calculus?

Prolog

Consider the following code snippet:

```
replace(X,Y,[],[]).  
replace(X,Y,[X|Xs],[Y|Ys]) :- !, replace(X,Y,Xs,Ys).  
replace(X,Y,[Z|Xs],[Z|Ys]) :- replace(X,Y,Xs,Ys).
```

The intended meaning of `replace(+X,+Y,+Xs,-Ys)` is that `Ys` is derived from the list `Xs` by replacing all occurrences of `X` by `Y`.

Task 4. Identify if the cut in the second clause is red or green, and explain why.

Task 5. Write an alternative version of `replace` without using `cut`.

Task 6. Implement `gcd/3` predicate that computes the greatest common divisor of two non-negative integers. The third position should be the GCD for the first two. E.g.

```
?- gcd(6,8,X).
```

```
X=2
```

```
Yes
```