CS 511 Formal Methods, Fall 2018 Instructor: Assaf Kfoury

Class Notes

October 11, 2018 Parul Sohal

(These lecture notes are **not** proofread and proof-checked by the instructor.)

- Reviewed Prenex Form

  The prenex form states for every WFF there is an equivalent WFF with the same, free variables where all quantifiers appear at the beginning.
  The quantifiers will all be on the top if we make a parse tree for a prenex form formula. This makes it easier to understand the formaula.
  When changing from non-prenex to prenex form, have to be careful in substitution, as might capture free variables (read lecture slides 4 to remind yourself).

- Reviewed Soundness and Completeness

  Completeness can be informally seen as that you can prove anything that's right.
  Formally, it is defined as if we have some formula, $\varphi_1, ..., \varphi_n$, then if we are $\varphi_1, ..., \varphi_n \vDash \Psi$, then we have $\varphi_1, ..., \varphi_n \vdash \Psi$.

  Soundness can be informally seen as that you cannot prove anything that's wrong.
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- SAT/SMT Solver

  There is some help in z3 to use quantifiers. We won't be using too much in this class, but good to experiment with them. For first order logic we have to use SMT as need quantifiers. Don't need it for propositional logic.