COMS22201: Language Engineering

Lab Exercises - Week 19 - Questions

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This worksheet will give you practice in using the axiomatic semantics of partial correctness to prove the correctness of **While** programs.

1. Show that the following assertions hold using the axiomatic semantics of *partial* correctness (remembering to discharge any proof obligations):

   (a) $\{x{=}n \wedge n \geq 0\}$ `while 2≤x do x:=x-2` $\{x{=}n\%2\}$

   (b) $\{x{=}n\}$ `y:=1; while ¬(x=1) do (y:=y*x; x:=x-1)` $\{y{=}n! \wedge n{>}\ 0\}$

   (c) $\{true\}$ `while true do skip` $\{false\}$

2. Suggest an inference rule for repeat loops repeat S until b in a way which does not rely on the existence of while loops in the language.

3. Write a simple program of your choice and prove its correctness with respect to some appropriate pre and postconditions using the axiomatic semantics. Bring your proof to the tutorial tomorrow.