Proving Subtype Inference

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I. Preliminaries

We work with the type system, subtyping relation, and `check`/`require` rules introduced in the report. Following are some definitions needed for the proofs.

- **Forcing rules:** The set of rules that force a type to be a subtype of another type, including CHECK-LAMBDA-FORCE, REQUIRE-LAMBDA-FORCE, CHECK-LET-FORCE, and REQUIRE-LET-FORCE.

II. Theorems

Theorem 1. *Suppose* $check(\emptyset, e')$ *succeeds. For any variable or a parameter* x *that has been declared with a type* τ*, the run-time value of* x *is guaranteed to have a type* τ*.*

Theorem 2. *If* $check(\emptyset, e')$ *succeeds,* $check(\emptyset, e'')$ *succeeds without passing any forcing rules.*

Corollary 1. *If* $check(\emptyset, e')$ *succeeds, then* e'' *is well-typed.*

III. Proofs of Propositions