98-317 Hype for Types

Homework 2

Due: 2019-09-10

Introduction

Today in class we looked at a small language called E♭ which introduced us to sums and products. For reference, the grammar and statics of E♭ are reproduced in the lecture notes on the course website.

(We also looked at some fun shenanigans with algebraic data types, but that's not on the homework.)

On this assignment, you will be filling out one of the typing rules for E♭ and completing some proof trees involving sum and product types.

Submission

This assignment is due on 2019-09-10 at 6:30 PM EST. Please submit your completed assignment to Autolab or email it to tkadur@andrew.cmu.edu.

Task 1. Complete the following inference rule for typing case analysis.

$$\frac{}{\Gamma \vdash \texttt{case}\ e\ \texttt{of INL}\ x_1 \Rightarrow e_1 \mid \texttt{INR}\ x_2 \Rightarrow e_2 : \tau}\ \textsf{case}$$

Task 2. Complete the following proof tree.

$$\frac{}{\cdot \vdash (\pi_1(\texttt{"hello"}, \texttt{"world"}), \pi_2(\texttt{"1"}, 5)) : \texttt{str} \times \texttt{int}}$$

Task 3. Complete the following proof tree.

$$\frac{}{\cdot \vdash \texttt{case INL 1 as int} + \texttt{str of INL}\ x \Rightarrow x \mid \texttt{INR}\ y \Rightarrow 0 : \texttt{int}}$$

Task 4. Complete the following proof tree.

$$\frac{}{x : \texttt{int}, y : \texttt{str} \vdash \texttt{INR}\ y\ \texttt{as}\ \texttt{int} + \texttt{str} : \texttt{int} + \texttt{str}}$$