

HW 02 (Part 1) ~~Activity~~: Expressions and States

A. Why?

Expressions are what denote values, so their syntax is important. Expressions have values relative to memory states, so recognizing and writing out states is important.

B. Outcomes

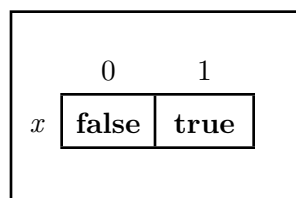
By the end of the assignment ~~activity~~ you should

- Be able to recognize legal and illegal expressions.
- Translate an English description of a state to/from a more-formal definition.

C. Questions

Work on the following problems and be ready to discuss your answers in groups at the beginning of the next lecture. ~~As you did last week, form groups of 5, assign roles, and answer the following questions. Email the results to f09es536@gmail.com~~

1. Assuming f and g are functions and x is a legal argument for both of them, are both of **(if B then f else g fi)**(x) and **(if B then $f(x)$ else $g(x)$ fi)** legal expressions in our programming language?
2. Repeat the previous question using **(if B then y else z fi)**[x] and **(if B then $y[x]$ else $z[x]$ fi)** where y and z are array variables of type **int** \rightarrow **int** and x is an **int** variable.
3. Assume z is an array variable of type **int** \times **int** \rightarrow **int** and j and k are **int** variables. Write an expression in our programming language that means “if j is zero and k is 6, then 17; if j isn’t zero or k isn’t 6, then $z[j, k]$.”
4. Let σ_1 be the state that maps b to true and c to 42. Complete the following set-of-pairs representation for σ_1 : $\sigma_1 = \{ (???, ???), (???, ???) \}$
5. For the same σ_1 , complete the following definition: $\sigma_1(???) = ???$, $\sigma_1(???) = ???$.
6. Let σ_2 be the state with the memory diagram below. Complete the following definition: $\sigma_2(x)(???) = ???$, $\sigma_2(???) (???) = ???$



7. Let $\sigma_3(c) = 4$, $\sigma_3(y)(0) = 7$, $\sigma_3(y)(1) = 14$, $\sigma_3(y)(2) = 14$. Draw a memory diagram for the same σ_3 . ~~Don't email your answer to this problem (unless you're really good at ASCII art? :)~~
8. For the same σ_3 , write out the definition of a function α such that $\sigma_3(y) = \alpha$.