

Homework I
CS411: Computer Languages – Dr. Shaffer
Due: September 6, 2006

1. Write a Scheme statement which creates a new global variable `banana` and binds it to the string “grows on tree”.
2. Write a Scheme statement which computes $3 * 8 + 4 - 17$. That is, convert this infix expression to Scheme.
3. Write three different Scheme expressions which create the list `(1 2 three four)` (where `three` and `four` should be Scheme symbols). Use `quote`, `list` and `'`.
4. Write the following list in “fully dotted form” and then draw a cons-cell picture of it: `(a (b (c d) e f g) h (i j))`.
5. Write an expression which creates the list `(a b (1 2 3))` using `cons`.
6. Write a Scheme expression which uses `car` and `cdr` to return the second element of the list `'(apple banana pajamas curtains)`.
7. What does the `cadr` function return when applied to the list in problem 6?
8. Write a Scheme expression which uses `cdr` to return a list containing only last two elements of the list `'(a b c 1 2 3)`.
9. What does the `cddddr` function return when applied to the list in problem 8?
10. Write a Scheme expression which uses `vector-ref` to return the third element of the vector `#(frog lizard snake iguana)`.
11. Define a function `times3` which takes a single argument and returns the value of this argument multiplied by three. Do not include any error checking (assume that the argument is a number).
12. Define a function `times3-or-4` which takes a single argument and if the argument is odd, returns 3 times the argument otherwise 4 times the argument.
13. Write a complete exposition on the difference between Scheme interned symbols and strings. You must address specifically how they are different under the standard equivalence predicates: `eq?`, `eqv?`, and `equal?`. You should combine whatever on-line resources you can find with exploration of the behavior of string and symbols in Gambit Scheme.