CS 61A, Summer 2006 June 28, 2006
LAB ASSIGNMENT 1B

1. For each of the following expressions, what must `f` be in order for the evaluation of the expression to succeed, without causing an error? For each expression, give a definition of `f` such that evaluating the expression will not cause an error, and say what the expression's value will be, given your definition.

```
f
(f)
(f 3)
((f))
(((f)) 3)
```

2. Write a procedure `substitute` that takes three arguments: a sentence, an *old* word, and a *new* word. It should return a copy of the sentence, but with every occurrence of the old word replaced by the new word. For example:

```
> (substitute '(she loves you yeah yeah yeah) 'yeah 'maybe)
(she loves you maybe maybe maybe)
```

3. Find the values of the expressions

```
((t s) 0)          ((t (t s)) 0)          (((t t) s) 0)
```

where `s` is defined as `(define (s x) (+ 1 x))`, and `t` is defined as follows:

```
(define (t f)
  (lambda (x) (f (f (f x)))) )
```

Work this out yourself before you try it on the computer!

4. Consider a Scheme function `g` for which the expression

```
((g) 1)
```

returns the value 3 when evaluated. Determine how many arguments `g` has. In one word, also describe as best you can the *type* of value returned by `g`.

5. Write and test the `make-tester` procedure. Given a word `w` as argument, `make-tester` returns a procedure of one argument `x` that returns true if `x` is equal to `w` and false otherwise. Examples:

```
> ((make-tester 'hal) 'hal)
#t
> ((make-tester 'hal) 'cs61a)
#f
> (define sicp-author-and-astronomer? (make-tester 'gerry))
> (sicp-author-and-astronomer? 'hal)
#f
> (sicp-author-and-astronomer? 'gerry)
#t
```