Spring, 1992 Name: ____________________

CS 342 — Principles of Programming Languages

Smalltalk Test (Terms, Version 2)

The usual instructions apply.

Don't feel obligated to fill up all the space on the page. Conversely, don't feel limited by the space on the page, since you can use the back if you explicitly tell us on the front when you do so.

1 Terms

1. (4 points) What is a "class" in Smalltalk? What is the CLU equivalent?

2. (6 points) Give the CLU equivalent for the Smalltalk term "instance variable". How are instance variables important in Smalltalk?

3. (8 points) Describe and illustrate (i.e., with an example) what inheritance means for methods in Smalltalk.

4. (10 points) Consider the following class definitions.

```
(class C1 Object
  () ; no instance variables
  (define initC1 () self)
  (define fred: (x) (* 2 x))
  (define wilma: (x) (super-wilma: self x))
  (define super-wilma: (x) (+ 5 x))
  (define barney: (x) (betty: self x))
  (define betty: (x) (wilma: self x))
)
(define mkC1 () (initC1 (new C1)))

(class C2 C1
  ()
  (define initC2 () self)
  (define fred: (x) (super-wilma: self x))
  (define wilma: (x) (barney: self x))
  (define betty: (x) (fred: self (+ x 7)))
)
(define mkC2 () (initC2 (new C2)))
```

For each of the following expressions, describe the execution (in words, especially noting which methods of which classes are called), and give the result the expression (if any). If the expression does not terminate, say that and explain why.

(a) `(fred: (mkC2) 8)`

(b) `(wilma: (mkC2) 9)`