

**INSTRUCTIONS**

- You have 10 minutes to complete this quiz.
- The exam is closed book, closed notes, closed computer, closed calculator.
- Mark your answers **on the exam itself**. We will *not* grade answers written on scratch paper.
- For multiple choice questions, fill in each option or choice completely.
  - means mark **all options** that apply
  - means mark a **single choice**

|   |       |
|---|-------|
| Last name   |       |
| First name  |       |
| Student ID number   |       |
| CalCentral email (_@berkeley.edu)                                   |       |
| Discussion Section  | _____ |
| <i>All the work on this exam is my own.</i><br><b>(please sign)</b> |       |

0. **Your thoughts?** Are you more of a Python-ista, or a Scheme-er?

## 1. Interpretive Dance

Assume the following definition has been loaded into the Scheme interpreter.

```
(define (sum-of-squares x y z)
  (+ (* x x) (* y y) (* z z)))
```

For each of the following Scheme expressions, mark the number of calls made to `scheme_eval` and `scheme_apply`:

(a) `(+ 5 (* 3 7 3))`

`scheme_eval`       3    4    5    6    7    8    9

`scheme_apply`     1    2    3    4    5    6

(b) `(sum-of-squares 3 4 5)`

`scheme_eval`       4    5    8    10    14    19    24    25

`scheme_apply`     1    2    3    4    5    6

## 2. Scheming

For each of the following Scheme expressions, mark the choice corresponding to the correct `Pair` representation that `scheme_read` would return.

(a) `(func (4 5) 3)`

`Pair('func', Pair(4, Pair(5, Pair(3))))`

`Pair('func', Pair(4, Pair(5, Pair(3, nil))))`

`Pair('func', Pair(Pair(4, 5), Pair(3, nil)))`

`Pair('func', Pair(Pair(4, Pair(5, nil)), Pair(3, nil)))`

Attempting to `scheme_read` the above expression would result in a syntax error.

(b) `'(1 2 (3))`

`Pair(1, Pair(2, Pair(3, nil)))`

`Pair(1, Pair(2, Pair(Pair(3, nil), nil)))`

`Pair('quote', Pair(1, Pair(2, Pair(Pair(3, nil), nil))))`

`Pair('quote', Pair(Pair(1, Pair(2, Pair(Pair(3, nil), nil))), nil))`

Attempting to `scheme_read` the above expression would result in a syntax error.

(c) `(cdr () 'cdr)`

`Pair('cdr', Pair(nil, Pair('cdr', nil)))`

`Pair('cdr', Pair(Pair(nil, Pair('cdr', nil))))`

`Pair('cdr', Pair(nil, Pair(Pair('quote', Pair('cdr', nil)), nil)))`

`Pair('cdr', Pair(Pair(nil, Pair(Pair('quote', Pair('cdr', nil))))))`

Attempting to `scheme_read` the above expression would result in a syntax error.