INSTRUCTIONS

- You have 10 minutes to complete this quiz.
- The exam is closed book, closed notes, closed computer, closed calculator.
- The final score for this quiz will be assigned based on effort rather than correctness.
- Mark your answers on the exam itself. We will not grade answers written on scratch paper.
- For multiple choice questions,
  - ☐ means mark all options that apply
  - ☐ means mark a single choice

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<td>First name</td>
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<td>Student ID number</td>
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<td>CalCentral email (\texttt{@berkeley.edu})</td>
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<th>Teaching Assistant</th>
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<td>○ Alex Stennet</td>
<td>○ Kelly Chen</td>
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<td>○ Kavi Gupta</td>
<td>○ Samantha Wong</td>
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\textit{All the work on this exam is my own. (please sign)}
1. (5 points) Interpretive Dance

(a) (2 pt) Assume the following definition has been loaded into the Scheme interpreter.

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

Given the following Scheme expressions, mark the number of calls made to \texttt{scheme_eval} and \texttt{scheme_apply}:

i. \((+ 5 (* 3 7 3))\)
   \begin{align*}
   \text{scheme_eval} & : 3 & 4 & 5 & 6 & 7 & 8 & 9 \\
   \text{scheme_apply} & : 1 & 2 & 3 & 4 & 5 & 6
   \end{align*}

ii. \((\text{sum-of-squares} 3 4 5)\)
   \begin{align*}
   \text{scheme_eval} & : 4 & 5 & 8 & 10 & 14 & 19 & 24 & 25 \\
   \text{scheme_apply} & : 1 & 2 & 3 & 4 & 5 & 6
   \end{align*}

(b) (3 pt) For each of the following Scheme expressions, mark the choice corresponding to the correct \texttt{Pair} representation that \texttt{scheme_read} would create.

i. \((\text{func} (4 5) 3)\)
   \begin{itemize}
   \item Attempting to \texttt{scheme_read} the above expression would result in a syntax error.
   \item \texttt{Pair('func', Pair(4, Pair(5, Pair(3)))))}
   \item \texttt{Pair('func', Pair(4, Pair(5, Pair(3, nil)))))}
   \item \texttt{Pair('func', Pair(Pair(4, 5), Pair(3, nil))}]
   \item \texttt{Pair('func', Pair(Pair(4, Pair(5, nil)), Pair(3, nil))))}
   \end{itemize}

ii. \('(1 2 (3))\)
   \begin{itemize}
   \item Attempting to \texttt{scheme_read} the above expression would result in a syntax error.
   \item \texttt{Pair(1, Pair(2, Pair(3, nil))})
   \item \texttt{Pair(1, Pair(2, Pair(Pair(3, nil), nil))})
   \item \texttt{Pair('quote', Pair(1, Pair(2, Pair(Pair(3, nil), nil))})
   \item \texttt{Pair('quote', Pair(Pair(1, Pair(2, Pair(Pair(3, nil), nil))), nil))}
   \end{itemize}

iii. \((\text{cdr} () '\text{cdr})\)
   \begin{itemize}
   \item Attempting to \texttt{scheme_read} the above expression would result in a syntax error.
   \item \texttt{Pair('cdr', Pair(nil, Pair('cdr', nil))})
   \item \texttt{Pair('cdr', Pair(Pair(nil, Pair('cdr', nil))})
   \item \texttt{Pair('cdr', Pair(Pair('quote', Pair('cdr', nil))}))
   \item \texttt{Pair('cdr', Pair(Pair('quote', Pair('cdr', nil))))})
   \end{itemize}