UNIVERSITY OF TORONTO
Faculty of Arts and Science
TERM TEST #1
CSC 104H1
Duration — 50 minutes

AIDS ALLOWED: 8.5” X 11” HANDWRITTEN AID SHEET, BOTH SIDES

LAST NAME: __________________________________________
FIRST NAME: __________________________________________

Do not turn this page until you have received the signal to start.
(In the meantime, please fill out the identification section above,
and read the instructions below.)

This test consists of 5 questions on 6 pages (including this one). When
you receive the signal to start, please make sure that your copy of the
test is complete.
Please answer questions in the space provided. You will earn 20% for
any question you leave blank or write “I cannot answer this question,”
on. You will earn substantial part marks for writing down the outline of
a solution and indicating which steps are missing.

Good Luck!
QUESTION 1. [4 marks]
If a problem has more than one correct algorithm that solves it, does it matter which correct algorithm is used? Explain briefly. If the answer is yes, give an example.

QUESTION 2. [6 marks]
Complete the table below. In each row, assume a, b, and c have the given values, and then evaluate the expression at the end of the row — it will be either true or false.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>(or (and a b) (not c))</th>
</tr>
</thead>
<tbody>
<tr>
<td>true</td>
<td>true</td>
<td>true</td>
<td></td>
</tr>
<tr>
<td>true</td>
<td>true</td>
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<tr>
<td>false</td>
<td>true</td>
<td>false</td>
<td></td>
</tr>
</tbody>
</table>
QUESTION 3. [10 marks]

Assume the expressions below have been typed into the definitions pane of DrRacket. Below each parenthesized expression write, draw, or describe its effect when the “Run” button is clicked. pic:hacker and pic:calendar are images supplied by picturing-programs.

(require picturing-programs)

(rotate
  (length (rest (list "five" 2 true (square 10 "outline" "red"))))
  pic:hacker)

(/ (* 3 (- 12 (+ 4 (string-length "five")))) 6)

(overlay
  (square 40 "solid" "blue")
  (triangle (+ 60 (image-height (square 40 "solid" "red"))) "solid" "green"))

(map flip-horizontal
  (reverse (list pic:calendar (triangle 10 "solid" "blue") pic:hacker)))
QUESTION 4. [10 MARKS]
Complete the functions above-average? and put-on-circle by:

(i) Adding another appropriate check-expect expression for each function.
(ii) Writing the body of the define statement.
(iii) Filling in the contract, putting what is consumed and what is produced after the “.”.

(require picturing-programs)

; above-average? : ->

; Is a more than the average of b and c? [the "average" of x and y is (x+y)/2]
(define (above-average? a b c) ; Write the definition body below here.
  (check-expect (above-average? 9 8 12) false)
)

; put-on-circle : ->

; im on a brown circle whose diameter is the height of im.
(define (put-on-circle im) ; Write the definition body below here.
  (check-expect (put-on-circle pic:calendar)
    (overlay pic:calendar (circle (* 2 (max (image-height pic:calendar)
        (image-width pic:calendar)))
      "solid" "brown")))
)
QUESTION 5. [10 marks]

Assume these two expressions have been typed into the definitions pane of DrRacket.

(require picturing-programs)

(define a-bird)

The following asks you to write some expressions, complete a check-expect, and write a function. Do not manually draw any bird images by hand.

PART (A) [2 marks] Write an expression that produces : 

PART (B) [2 marks]

Write an expression that produces : 

PART (C) [2 marks]

Write an expression that produces : 

PART (D) [1 mark]

Here are two check-expects for function chase. Complete the second one.

(check-expect (chase ) )

(check-expect (chase ) )

PART (E) [3 marks] Write the body of the define statement for the chase function:

(define )
# 1: _____/ 4
# 2: _____/ 6
# 3: _____/10
# 4: _____/10
# 5: _____/10

TOTAL: _____/40