**Exercise 11**: Use *only* **first**, **rest**, and **cons.**

**(define a '())**

**(define b '(()()()))**

**(define c '(Bob (Jane)))**

**(define d '(((Bob)(Jane))))**

**(define e 'Jane)**

**(define f '((Bob)Jane))**

**Section A.** Given the following definitions:

|  |  |  |
| --- | --- | --- |
| **Variable** | **Definition** | **Note:**  You are defining **Jane** as an **atom**;  therefore **e** will be equal to **Jane**, *not* **(Jane)** |
| **a** | ‘( ) |
| **b** | ‘( ( ) ( ) ( ) ) |
| **c** | ‘(Bob (Jane) ) |
| **d** | ‘( ( (Bob) (Jane) ) ) |
| **e** | ‘Jane |
| **f** | ‘( (Bob) Jane) |

Evaluate the following expressions and write your answer in the appropriate space. If the expression cannot be evaluated, write “Cannot be evaluated”.

|  |  |
| --- | --- |
| (first a) | Cannot be evaluated. |
| (first b) |  |
| (first c) |  |
| (first d) |  |
| (first e) |  |
| (rest f) |  |
| (rest c) |  |
| (rest d) |  |
| (rest e) |  |
| (cons a c) |  |
| (cons a d) |  |
| (cons a e) |  |
| (cons f c) |  |
| (cons e d) |  |
| (cons a (rest c)) |  |
| (cons e (rest f)) |  |
| (cons f (rest a)) |  |
| (cons a (rest b)) |  |
| (first (rest f)) |  |
| (first (rest (first d))) |  |
| (first (rest (cons a f))) |  |
| (rest (rest d)) |  |
| (first (rest f)) |  |

**Section B.** Given the following definitions:

|  |  |
| --- | --- |
| **Variable** | **Definition** |
| **a** | ‘(5 4 3 2 1) |
| **b** | ‘( (5) ( (4) (3) 3 ( (2) ) ) ) |
| **c** | ‘(5 (4 (3 (2 (1) ) ) ) ) |
| **x** | ‘(a b c (d) e f) |
| **y** | ‘((5) ((4 3) 2 (1))) |

Write an expression that will output the following:

|  |  |  |
| --- | --- | --- |
| **Using…** | **Output should be…** | **What is the expression?** |
| List **a** | '(4 3 2 1) | (rest a) |
| '(3 2 1) |  |
| 4 |  |
| List **b** | '((4) (3) 3 ((2))) |  |
| '((3) 3 ((2))) |  |
| '() |  |
| List **c** | '(4 (3 (2 (1)))) |  |
| 5 |  |
| '((3 (2 (1)))) |  |
| List **x** and **y** | '(a 5) |  |
| '(b ((4 3) 2 (1))) |  |
| '((5) a b c (d) e f) |  |