**Lab 15**: Use *only* **first**, **rest**, and **cons.**

**(define a 'Fred)**

**(define b 'Mary)**

**(define m '(()(())))**

**(define r '(Jane Mary))**

**(define s '())**

**(define p '((Bob) ((John Jill))))**

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

|  |  |  |
| --- | --- | --- |
| **Variable** | **Replacement** | **Note:**  You are defining **Fred** and **Mary** as **atoms**; therefore   * **a** will be equal to **Fred**, *not* **(Fred)** and * **b** will be equal to **Mary**, *not* **(Mary)**. |
| **a** | ‘Fred |
| **b** | ‘Mary |
| **m** | ‘( ( ) ( ( ) ) ) |
| **r** | ‘( Jane Mary ) |
| **s** | ‘( ) |
| **p** | ‘( ( Bob ) ( ( John Jill ) ) ) |

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

|  |  |
| --- | --- |
| (first a) |  |
| (first m) |  |
| (first r) |  |
| (first s) |  |
| (first p) |  |
| (rest a) |  |
| (rest m) |  |
| (rest r) |  |
| (rest p) |  |
| (cons a m) |  |
| (cons a r) |  |
| (cons a s) |  |
| (cons a p) |  |
| (cons m r) |  |
| (cons r (rest p)) |  |
| (cons s (rest r)) |  |
| (cons a (rest r)) |  |
| (cons a (rest p)) |  |
| (first (rest r)) |  |
| (first (rest (first p))) |  |
| (first (rest (cons a r))) |  |
| (rest (rest p)) |  |
| (first (rest p)) |  |

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

|  |  |
| --- | --- |
| **Identifier** | **Replacement** |
| **a** | ‘(1 2 3 4 5 6) |
| **b** | ‘((1) (2) ((3 4) 5 (6))) |
| **c** | ‘(1 (2 (3 4 5)) 6) |
| **x** | ‘(1 2 3 4 5 6) |
| **y** | ‘((a) (b) ((c d) e (f))) |

Write an expression that will output the following:

|  |  |  |  |
| --- | --- | --- | --- |
| **Using…** | | **Output should be…** | **What is the expression?** |
| List **a** | | 1 |  |
| '(3 4 5 6) |  |
| 3 |  |
| List **b** | | '(1) |  |
| '(2) |  |
| '((3 4) 5 (6)) |  |
| List **c** | | '(2 (3 4 5)) |  |
| '() |  |
| 3 |  |
| List **x** and **y** | '(1 (b) ((c d) e (f))) | |  |
| '(3 (c d) e (f)) | |  |
| '((a) 1 2 3 4 5 6) | |  |