What Will Scheme Print?

1. (list (cons 3 4) (append '(the cow) '(ran)) '())
2. (cons (list (cons '(a b) 'c) '(d e)) '(f g))
3. ((lambda (+ /) (let ((- *) (/ +)) (- / +)) 2 5))
4. (caddr (cons '(3 a (cons 2 1)) '((cons 3 b) lol)))

Box-and-Pointer

(append (list (list '(1 2))) (cons '(3) '(4 5)))

Trees

Write a procedure burned-tree? that takes in two Trees and returns true if the first tree is a burned-down version of the second.

Consider the following two Trees:

```
      1
     /|
    2 3 4
   / | |
  5 6 7 8 9
```

Tree A

```
      1
     /|
    2 4
   / |
  8 9
```

Tree B

We say that Tree B is a burned-down version of Tree A because both Trees have the same root and Tree B has the same structure (as in every node has same children in the same order) as Tree A except certain sub-trees got destroyed like the leaves 5, 6 and the branch 3--7.

As another example:

```
      1
     / |
    2 3
   / |
  4 5
```

Tree C

```
      1
     / |
    2 3
   / | |
  4 5 6
```

Tree D

```
      1
     / |
    2 3
   / |
  4 5
```

Tree E

```
      2
     / |
    3 4
   / |
  5 6
```

Tree F

```
      1
     / |
    2 3
   / |
  4 5
```

Tree G

Here, Tree D is a burned-down version of Tree C. Tree E is NOT a burned-down version of Tree C because the node 2 does not have 9 has a direct child in Tree C. Tree F is NOT a burned-down version of Tree C because they have different roots. Tree G is NOT a burned-down version of Tree C because order of the direct children of the root node 1 is wrong. Note also that the burned-down version might have less children than the original Tree.
Recursion and Higher-Order Functions

Write a procedure called product-list that takes in a list of numbers \((a_1, a_2, a_3, \ldots)\) and returns another list \((a_1, a_1a_2, a_1a_2a_3, \ldots)\). You may use higher-order functions and recursion.

Orders of Growth

Assume a cube of water of side length \(n\). Assume that we need to perform a calculation on every water molecule that takes \(n\) time.

1. What is the order of growth of the total number of calculations required?
2. What if we considered a sphere of water of radius \(n\)?