In order to do the following exercises assume:

- The expression \( x + y \) is represented as \((\text{PLUS } x \ y)\). The expression \( xy + x + 3 \) is represented as \((\text{PLUS } (\text{TIMES } x \ y) \ x \ 3)\).

- The list \(((A \ B) \ (B \ A \ C \ D) \ (C \ B \ D \ E) \ (D \ B \ C \ E) \ (E \ C \ D \ F) \ (F \ E))\) is used to represent the following graph according to a scheme whereby there is a sublist for each vertex consisting of the vertex itself followed by the vertices to which it is connected.

![Graph Diagram]

1. If we represent sums and products as indicated above and use \((\text{MINUS } X)\), \((\text{QUOTIENT } X \ Y)\), and \((\text{POWER } X \ Y)\) as representations of \(-x\), \(x/y\), and \(x^y\) respectively, then

   (a) What do the lists
   
   \[\text{QUOTIENT 2 (POWER (PLUS X (MINUS Y)) 3)}\]
   
   and
   
   \[\text{PLUS -2 (MINUS 2) (TIMES X (POWER Y 3.3))}\]
   
   represent?

   (b) How are the expressions \(xyz + 3(u + v)^{-3}\) and \((xy - yx)/(xy + yx)\) to be represented?

2. In the above mentioned graph notation, what graph is represented by the list

   \(((A \ D \ E \ F) \ (B \ D \ E \ F) \ (C \ D \ E \ F) \ (D \ A \ B \ C) \ (E \ A \ B \ C) \ (F \ A \ B \ C))\)?

3. Write the list \((\text{PLUS } (\text{TIMES } X \ Y) \ X \ 3)\) as an s-expression. This is sometimes referred to as “dot-notation.”

4. Write the following s-expressions in list notation to whatever extent is possible:

   (a) \((A . \ NIL)\)
   
   (b) \((A . \ B)\)
   
   (c) \(((A . \ NIL) . \ B)\)
   
   (d) \(((A . \ B) . ((C . D) . \ NIL))\)