Fall 2003

# LISP Written Assignment #1

CMSC 420
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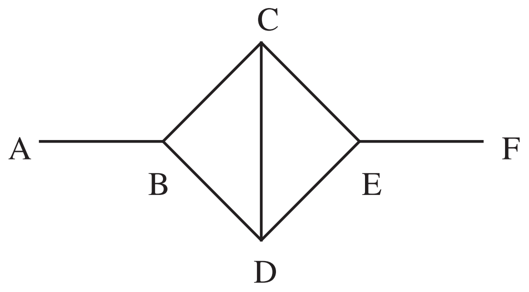
In order to do the following exercises assume:

- The expression $x + y$ is represented as `(PLUS x y)`. The expression $xy + x + 3$ is represented as `(PLUS (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.




1. If we represent sums and products as indicated above and use `(MINUS X)`, `(QUOTIENT X Y)`, and `(POWER X Y)` as representations of $-x$ , $x/y$, and $x^y$ respectively, then
   (a) What do the lists
   `(QUOTIENT 2 (POWER (PLUS X (MINUS Y)) 3))`
   and
   `(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 `(PLUS (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))`