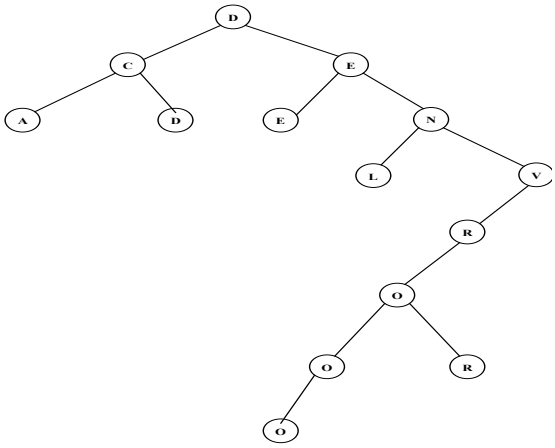
ACSL

2013 - 2014 **American Computer Science League** **Contest #4**

Junior Division Solutions

1. Data Structures

The binary tree formed is shown on the right.



1. O and R

2. Data Structures

The stack is constructed using LIFO as follows: R, RO, ROC, ROCK, ROC, RO, ROY, ROYM, ROY, ROYT, ROYTN, ROYT, ROY. The next element POPPED would be Y.

2. Y

3. Digital Electronics

The circuit translates to the Boolean expression: $\overline{(\overline{A}+AB)B}$

$\overline{(\overline{A}+AB)B} = \overline{\overline{A}+AB}+\overline{B} = \overline{\overline{A}}(\overline{AB})+\overline{B} = A(\overline{A}+\overline{B})+\overline{B} = A\overline{A}+A\overline{B}+\overline{B} = \overline{B}(A+1) = \overline{B}$

3. $\overline{B}$

4. Digital Electronics

The circuit translates to: $\overline{\overline{(\overline{A+AB})(B+C)}\overline{C}}$

Note the first two factors may be commuted and the third may come first and the addends within the parentheses may be commuted.

4. $\overline{\overline{(\overline{A+AB})(B+C)}\overline{C}}$

5. What Does this Program Do?

The first loop looks for k's and letters after m and puts them in b$.
It also looks for I's and letters after w and puts them in c$.
The result is:b$ = "ktstssksnwvsownyrontostvs" and c$ = "iiyii"
d$ is the concatenation of b$ and c$.The next loop compares 2 letters at a time and only places a letter in e$ if the first is alphabetically after the second letter. It places the second letter in e$ resulting in "ssknvsonronosii". The last loop counts the number of n's in e$. The answer is 3.

5. 3