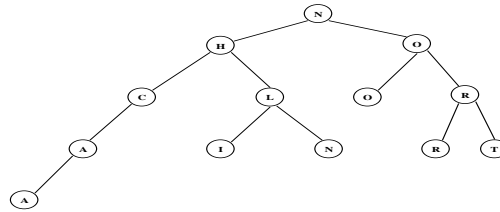


Senior Division Solutions

1. Data Structures

The internal path length is:
 $2*1+4*2+5*3+1*4 = 29$



1. 29

2. Data Structures The construction is as follows: M, ME, MED, ED, EDI, EDIT, EDITE, EDIT, DIT, DITR, DITRA, ITRA, TRA, TR, TRE, TREA, TREAN, REAN, EAN, EANS, EANSE, ANSEA, NSEA
 The next popped item is A since it ended as a stack.

2. A

3. Digital Electronics The circuit translates to: $\overline{(AB)(B+C)+C}$
 $\overline{(AB)(B+C)+C} = \overline{(AB)(B+C)}C = (\overline{AB} + \overline{B+C})C$
 $= ((\overline{A} + \overline{B}) + \overline{BC})C = \overline{AC} + \overline{BC} + \overline{BCC} = (\overline{A} + \overline{B})C$
 So $(\overline{A} + \overline{B})C = 1 \Rightarrow \overline{AB} = 1 \wedge C = 1 \Rightarrow AB = 0 \wedge C = 1$
 Therefore (0, 0, 1), (0, 1, 1), (1, 0, 1) make the circuit true.

3. (0,0,1)
 (0,1,1)
 (1,0,1)

4. Digital Electronics Circuit translates $(A + \overline{(A+B)(BC)} \oplus ((\overline{C+D})\overline{D}))$
 and simplifies to: $(A + \overline{B} + \overline{C}) \oplus \overline{CD}$

4. 6

A	B	C	D	\overline{B}	\overline{C}	\overline{D}	$A + \overline{B} + \overline{C}$	\overline{CD}	\oplus
0	0	0	0	1	1	1	1	1	0
0	0	0	1	1	1	0	1	0	1
0	0	1	0	1	0	1	1	0	1
0	0	1	1	1	0	0	1	0	1
0	1	0	0	0	1	1	1	1	0
0	1	0	1	0	1	0	1	0	1
0	1	1	0	0	0	1	0	0	0
0	1	1	1	0	0	0	0	0	0
1	0	0	0	1	1	1	1	1	0
1	0	0	1	1	1	0	1	0	1
1	0	1	0	1	0	1	1	0	1
1	0	1	1	1	0	0	1	0	1
1	1	0	0	0	1	1	1	1	0
1	1	0	1	0	1	0	1	0	1
1	1	1	0	0	0	1	1	0	1
1	1	1	1	0	0	0	1	0	1

5. LISP (CAR(CAR(CDR(REV(CDR '((2(1 2))(4 1 3)((2 1)3)4))))))
 $=$ (CAR(CAR(CDR(REV '((4 1 3)((2 1)3)4))))))
 $=$ (CAR(CAR(CDR '(4((2 1)3)(4 1 3))))))
 $=$ (CAR(CAR '((2 1)3)(4 1 3)))
 $=$ (CAR '((2 1)3)) = (2 1)

5. (2 1)