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| **2016-2017** | **ACSL** American Computer Science League | **All-Star Contest** |

Junior Division

**Instructions for Short Round Questions**

1. **MATERIALS ALLOWED**

* Plain paper and pencils
* No calculators, headphones or any type of electronic device

1. **SCORE SHEETS**

* Use pencils only to mark the answers.
* Put your name, school name, grade and division on the back of the scoresheet.
* No erasures are allowed – use an additional score sheet if necessary.
* There will be no appeals based upon answer sheet errors.

1. **STUDENT PROCEDURES**

* Keep your eyes on your own paper.
* Keep answer sheets and scrap paper guarded.
* You must stay in the room until the end of the test.
* You can keep all materials at the end.
* The time limit is 45 minutes.

1. **TEST ANSWERS**

* Proctors will read the letter answers at the end of the testing period.
* Appeals in writing must be brought to the scoring room no later than 3:30 PM. The appeal must show your detailed solution.

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| 1. Boolean Algebra   Simplify completely: | 5. None of the above |
| 1. Bit-String Flicking   Let X = abcde. Solve the following bit string equation for X:  (LCIRC-3 (RSHIFT-1 X) OR 11010 AND NOT (RCIRC-2 10001)) =  ((LSHIFT-2 10101) XOR 01110) | 1. \*010\* 2. \*0\*\*\* 3. \*1\*0\* 4. \*0\*1\* 5. None of the above |
| 1. Recursive Functions   Find  (((14))), given the following definition: | 1. 8 2. 10 3. 11 4. 14 5. None of the above |
| 1. Digital Electronics   How ordered triples make the following circuit TRUE? | 1. 4 2. 3 3. 1 4. 0 5. None of the above |
| 1. Prefix-Infix-Postfix   Given the following operations: % means MOD (integer remainder) such  that 5%2 = 1 and \ means DIV (integer quotient) such that 5\3 = 1, evaluate  the following prefix expressions if A=5, B=12, C=8, and D=20. Note that all  numbers in the original expression are single digits.  / - ^ \ \* C - - D A B A \ ^ % + A C - D B 2 7 1 - B % B A | 1. 6.4 2. 6.3 3. 63 4. 3.6 5. None of the above |
| 1. Computer Number Systems   Tickets for a concert were numbered from 116 to AA16. If when the ticket  number is converted to binary it contains the string “10101”, then the lucky  ticket holders will receive a Back Stage Pass for after the concert. How  many (one pass per winning ticket) passes were given out if the concert was  sold out? | 1. 13 2. 15 3. 45 4. 49 5. None of the above |
| 1. What Does This Program Do?     What is the output for the following program?  DIM S(5,5): REM ALL VALUES START AT 0  A = -15: D = 2: R = 1: C = 3  S(R,C) = A  FOR X = 2 TO 25  A = A + D  IF( R = 1) AND (C = 5) THEN  R = R + 1  ELSE  R = R - 1  IF R = 0 THEN R = 5  C = C + 1  IF C = 6 THEN C = 1  IF S(R,C) <> 0 THEN C = C - 1 : R = R + 2  END IF  S(R,C) = A  NEXT X  FOR X = 1 TO 5  V = V + S(X,X)  W = W + S(X,6-X)  NEXT X  PRINT V + W  END | 1. 80 2. 45 3. -30 4. 100 5. None of the above |
| 1. Data Structures   Given the binary search tree for LOSANGELESCA, delete the root node.  List the nodes at depth 3 from left to right. | 1. A, G 2. E, O 3. E, L 4. C, N, S 5. None of the above |