Nassau County Interscholastic Mathematics League

Contest # 2 **2001-2002**

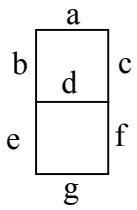
Answers must be exact or must have 4 (or more) significant digits, correctly rounded, unless otherwise noted.

Calculators allowed

Problems 7-8. Time limit: 10 minutes.

7. On the planet Python, there are 30 cities, one of which is the capital, Monty. The capital has one road to each of the other cities. Each pair of non-capital cities is connected by exactly one road. How many roads are there on Python?

8. A calculator lights digits by lighting some combination of the seven segments (labeled a-g). An anti-calculator lights a digit by lighting the opposite set of segments. For example, a 2 on a regular calculator is formed by segments a, c, d, e, g; on an anti-calculator, 2 is segments b and f only. List all digits that show two or fewer segments on an anticalculator.



Problems 9-10. Time limit: 10 minutes.

9. At an accounting firm, one of the four partners is guilty of embezzling. Each partner made two statements, of which one is true, the other false; except for the guilty party, both of whose statements are false. They said:

- Al: (1) Bob isn't guilty; (2) If Dave is guilty, then Carl is guilty.
- Bob: (1) I didn't do it; (2) Al did it or Dave did it.
- Carl: (1) If Dave isn't guilty, then Bob isn't guilty, (2) Bob is guilty and Carl isn't guilty.
- Dave: (1) Carl did it; (2) Bob is guilty and Carl isn't guilty.

Who is the guilty party?

10. (a classic) Evaluate: $100^2 - 99^2 + 98^2 - 97^2 + \mathsf{L} \; + 4^2 - 3^2 + 2^2 - 1^2$.

Problems 11-12. Time limit: 10 minutes.

11 In quadrilateral ABCD, diagonal $\overline{BD}$ is drawn.
m∠ABD=61°,m∠ADB=51°,m∠C=45° *and* $m\angle CBD = 55°$. Arrange in order from shortest to longest the segments $\overline{AB}, \overline{BC}, \overline{CD}, \overline{AD}$ *and* $\overline{BD}$

12. The point $(7,5)$ is on the graph of $y = f(x)$. What point must be on the graph of $y = 3f(2x-1)$?

Answers.

7.	435	8.	2,3,5,6,8,9,0
9.	Bob	10.	5050
11.	$\overline{AB}, \overline{AD}, \overline{BD}, \overline{CD}, \overline{BC}$	12.	$(4,15)$