Contest #5   **Bergen County Math League**   **2019–2020**

Part I   *Time Limit:* 12 minutes   **Calculators Allowed**

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

5–1. The three sides of a triangle are also sides of squares with areas 225, 196, and 169, respectively. What is the area of the triangle?

5–2. Twenty-four people are gathered, and everyone shakes hands with everyone else. They begin at 9:00 a.m., each handshake takes thirty seconds, and twelve pairs are shaking hands during each thirty-second period. What time is the handshaking completed?

Part II   *Time Limit:* 12 minutes   **Calculators Allowed**

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

5–3. For all real numbers x, $f(2x) = x^2 - x + 3$. Express $f(x)$ in terms of x.

5–4. Two semicircles each have radius two. The first is centered at $B(-1, 0)$ and drawn in quadrant I. The second is centered at $C(1, 0)$ and drawn in quadrant II. They intersect at A. Find the area of the region bounded by $\overline{BC}$, $\overparen{AB}$, and $\overparen{AC}$.

Part III   *Time Limit:* 12 minutes   **Calculators Allowed**

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

5–5. Ace, Flash, and Speedy ran a race and one of them won. Ace said that he lost and Flash lost. Flash said that Ace lost and Speedy won. Speedy said that he lost and Ace won. If one of them lied once and told the truth once, one of them told the truth twice, and one of them lied twice, who won the race?

5–6. Factor 1000001 as a product of two primes.

Answers

5–1. 84

5–2. 9:11:30 a.m.

5–3. $\frac{x^2}{4} - \frac{x}{2} + 3$

5–4. $\frac{4\pi}{3} - \sqrt{3}$

5–5. Ace

5–6. $101 \cdot 9901$