

# 2023 SSMO Relay Round 2

SMO Team

**RR 2 Part 1:** Consider the cubic polynomial  $P(x) = ax^3 + bx^2 + cx + d$ , where  $a, b, c, d$  are single-digit integers, which has roots of approximately

$$x \approx -0.9518399, 0.2055095, 1.460616.$$

Compute  $|f(3)|$ .

**RR 2 Part 2:** Let  $T = TNYWR$ . Suppose that  $L = \lfloor \sqrt{N} \rfloor$  points are evenly spaced around the circle. Find the number of ways to select  $k \geq 3$  points such that the  $k$ -gon formed strictly contains the center of the circle.

**RR 2 Part 3:** Let  $T = TNYWR$ . In a committee of 2023 people,  $N$  are scientists and the rest are builders. In order to make a building,  $\frac{N}{2}$  people must be chosen with at least one scientist and one builder. If  $x$  is the number of ways to do this, find the largest integer  $a$  such  $2^a \mid x$ .

