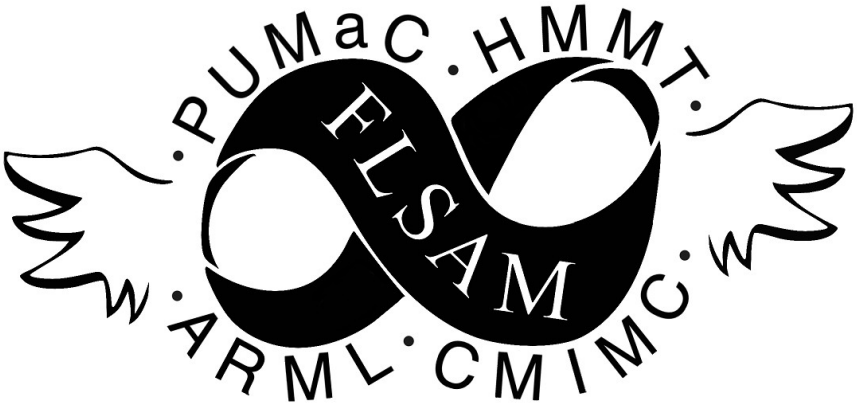
Florida Student Association of Mathematics



2023-2024 PUMaC Tryout

October 14-15, 2023

Round 1: Algebra

Welcome to the **FLSAM PUMaC Tryout!** The tryout has 4 rounds, each of which will consist of 4 problems to be completed in 30 minutes. Scoring is based on correct answers; there is no penalty for wrong answers. All answers are positive integers. Good luck!

1. Alex is now reading *Fahrenheit 451*, which has 158 pages numbered $1-158$. Alex flips through a section of a book, only reading every other page. If the sum of the page numbers he reads happens to be 451, what page did he start on?

2. Find the number of real solutions x to $x^2 + \lfloor x \rfloor = n$, where n is any integer less than or equal to 2023. Note that $\lfloor x \rfloor$ denotes the greatest integer less than or equal to x.

3. Let $a \star b$ be equal to one of $a+b$, $a-b$, $a \cdot b$, or a/b, each chosen with equal probability. If the expected value of $((((1 \star 2) \star 3) \cdots \star 9) \star 10)$ can be written as $\frac{P_1 P_2 P_3 P_4}{P_5}$ for prime powers $P_1, P_2, \ldots, P_5$ what is $P_1 + P_2 + \cdots + P_5$?

4. Let $f(x) = 2x^3 - 21x^2 + 65x - 54$. Given that the real solution to $f(f(f(x))) = 8x$ can be expressed as $\frac{m}{n}$ for relatively prime integers m, n, compute $m^2 + n^2$.