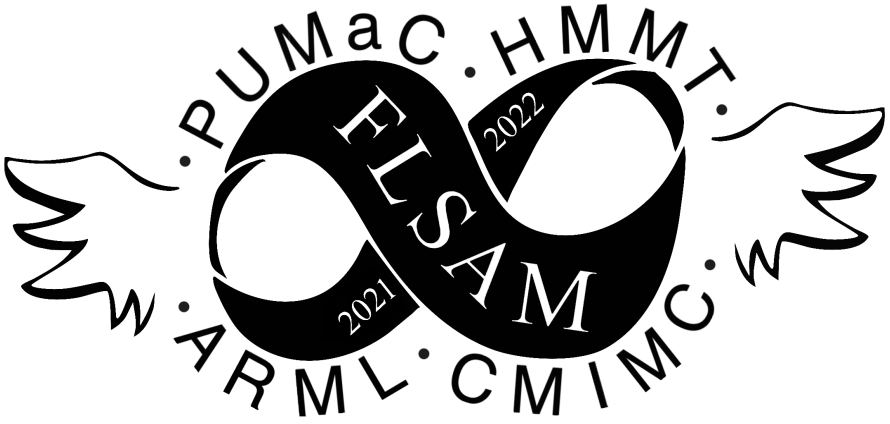
Florida Student Association of Mathematics



2022 ARML Tryout

Set 5 of 7

Welcome to the **2022 FLSAM ARML Tryout!** The tryout will consist of **7 sets** of **2 problems each**. You will have **10 minutes** to work on each set. Write your name and answers directly on each problem set. Scoring is based on the number of correct answers; there is no penalty for wrong answers. Good luck!

Round 5

Name: _____

9. _____ **10.** _____

9. Consider the set $S = \{1, 2, 3, \ldots, 20\}$. Adam selects 3 distinct elements a, b, c from S. Let $d = \gcd(a, b, c)$. If the probability that d is prime is $\frac{m}{n}$ for relatively prime positive integers m and n, find $100m + n$.

10. Three points A, B, C are marked on a sphere Ψ with diameter at least π is such that the shortest distance between A, B traveling on the surface of Ψ is 2, the shortest distance between B, C is 3, and the distance between C, A is 4. In space $\angle ABC = 90^\circ$; that is, the angle between line segments $\overline{AB}, \overline{BC}$ is 90°. What is the ratio of the surface area to the radius of Ψ?