28^{th} TJIMO

Alexandria, Virginia

Round: **Practice Team**

Problem 1. Determine the value of $(3^{3^2} - 3^{2^3} + 3^{2^2} - 2^{3^3})(3 + 3 - 3 + 2)^3(3^2 - 2^3 - 1)(3^3 + 2^2 + 1^1)$.

Problem 2. Michael has a playlist with 6 songs in it, but 1 of the songs is a repeat of another. If he presses shuffle, how many possible orders are there for his playlist?

Problem 3. Edwin is swimming in a circular lake. He swims at 2π meters per minute. If it takes him 2400 seconds to swim around the edge of the lake, what is the radius of the lake?

Problem 4. If $x + \frac{1}{x} = 4$, what is $x^2 + \frac{1}{x^2}$?

Problem 5. What is the area of a square with all four of its vertices on a circle of radius 10?

Problem 6. Timmy rolls 4 standard, fair, six-sided die. What is the probability that at least one of the number he rolls is prime?

Problem 7. Let a, b, and c be real numbers such that $a + b + 2c = 2015$, $a + 2b + c = 2016$, and $2a + b + c = 2017$. What is the value of $a + b + c$?

Problem 8. Aaditya is downloading an Android app. Every second, his phone has an equal chance to either download 20% of the app or do nothing. What is the probability that after 8 seconds, the app will have finished downloading?

Problem 9. A triangle with integer side lengths has a perimeter of 5. What is its area?

Problem 10. What is the largest prime factor of $17^3 + 1$?