

Advanced 1 Competition Winter 2024

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March 10th, 2024

1 Estimathon

1.1 Overview

Your team will have 60 minutes to work on 14 estimation problems. The answer to each problem is a positive number.

Your team will submit inclusive intervals for each problem. Intervals may not contain negative numbers or zero.

No calculators.

Points will be assigned proportional to score.

1.2 Scoring

An interval is good if it contains the correct answer. After the 60 minutes is over, the final score for your team will be:

$$\left(10 + \sum_{\text{good intervals}} \left\lfloor \frac{\text{max}}{\text{min}} \right\rfloor \right) \cdot 2^{13 - (\text{number of good intervals})}$$

So for every problem you get wrong, your score doubles. Furthermore, your score is scaled by a factor that gets bigger for bigger intervals. Thus, you are encouraged to make your intervals as small as you can.

The team with the **lowest** score wins.

1.3 Submitting

Since you have up to 18 submissions for 13 problems, you may submit intervals for a given problem more than once. Only the last submission for any given problem is the one that will count towards your final score.

1.4 Notation

You may use scientific notation if you like, but nothing more complicated than that. E.g., the interval $[3 \cdot 10^6, 10^7]$ is fine, but $[3^7, 4^8]$ is not.

1.5 Problems

1. What is the population of LA county?
2. What is 3^{3^3} ?
3. SHIRT + TSHIRT = CLOTHES. What is CLOTHES²?
4. What is $^{100}\sqrt{2} - 1$?
5. How many words are in all seven Harry Potter books combined?
6. How many Starbucks are in the state of California?
7. How much is the most expensive paper shredder on walmart.com?
8. How many milliliters of blood are in the average human body?
9. How many people live per square mile in the densest city in the world, Manila?
10. What is the Earth's circumference at the equator (in miles)?
11. What is the number of possible chess games?
12. How many passing yards does Tom Brady have in his NFL career?
13. How many gummy bears are in the jar?
14. What is the sum of the answers to all of the previous problems?

2 Sunny's Silly Symbol Strike 2.0

We will be holding a double-elimination style tournament. The exact format will depend on the number of teams. One of the teams may or may not be a computer.

In the end, points will be assigned by ranking.

2.1 Rules

- Each team has 11 spaces on a paper
- Each team makes the first move on their own paper
- Take turns switching papers, maximizing your own expression and minimizing your opponent's
- $n \div 0 = \infty$ but $-n \div 0 = n \div -0 = -\infty$
- $05 = 5$ is allowed
- $1 + -5 = -4$ is allowed but $1 - +5$ is not