
Estimathon

Prepared by Mark on March 8, 2024

Part 1: Rules

Your team will have 45 minutes to work on 16 estimation problems. The answer to each problem is a positive real number. Your team will submit intervals for each problem, which (ideally) contain the specified quantity.

An interval is “good” if it contains the true value. After the end of the game, your team’s score will be calculated as follows:

$$\left(10 + \sum_{\text{good intervals}} \left\lfloor \frac{\min}{\max} \right\rfloor\right) \times 2^{16 - \text{number of good intervals}}$$

For every problem you miss or leave blank, your score doubles.

Your job is to **minimize** your score.

Every team will get 20 answer sheets. You may use one of these sheets to submit an interval at any time. Make sure you write your team name, problem number, and interval (min and max) every time you submit.

There are 20 problems, but you are given 25 answer sheets. You may re-submit your solution to any problem (as long as you have sheets remaining). Your latest answer will be kept.

Your interval may not use any mathematical operations except for scientific notation (for example, $[2 \times 10^2, 3 \times 10^2]$)

Part 2: Problems

Problem 1:

What is the highest posted speed limit in the United States?

Problem 2:

How many words are in Isaac Asimov's *Foundation* trilogy?

Problem 3:

How much horsepower can the average horse produce, disregarding fatigue?

Problem 4:

What is $\sqrt[100]{2} - 1$?

Problem 5:

What was the stock price of Apple on 2023-01-10?

Problem 6:

How many distinct (non-isomorphic) groups are there on 60 elements?

Problem 7:

How many undergraduates were enrolled at UCLA in the Fall of 2021?

Problem 8:

Find the smallest $k > 10$ where $\sqrt{\frac{k!(k+1)!}{2}}$ is an integer

Problem 9:

How many hours of podcasts has Mark listened to in 3.5 years of driving to UCLA?

Problem 10:

For how many positive integers n less than 10,000 is $2^n - n^2$ divisible by 7?

Problem 11:

How many lines of code were in the Linux repository in 2022?

Problem 12:

Suppose you drop 16 needles of length 5 on ruled paper with distance 8.
What is the probability that three, four, or five needles cross a line?

Problem 13:

How many officially-recognized time zones are there?

Problem 14:

What is the smallest number ending in 34, divisible by 34, with a sum of digits equal to 34?

Problem 15:

How many distinct typewriter models have been produced by *Smith Corona* since 1886?

Problem 16:

What is the standard deviation of the above solutions?