2026 AIME I

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Question 1

Not yet answered

Marked out of 1

Patrick started walking at a constant speed along a straight road from his school to the park. One hour after Patrick left, Tanya started running at a constant speed of 2 miles per hour faster than Patrick walked, following the same straight road from the school to the park. One hour after Tanya left, José started bicycling at a constant speed of 7 miles per hour faster than Tanya ran, following the same straight road from the school to the park. All three people arrived at the park at the same time. The distance from the school to the park is $\frac{m}{n}$ miles, where m and n are relatively prime positive integers. Find $m+n$.

Answer:

Question 2

Not yet answered

Marked out of 1

Find the number of positive integer palindromes written in base 10, with no zero digits, and whose digits add up to 13. For example, 42124 has these properties. Recall that a palindrome is a number whose representation reads the same from left to right as from right to left.

Answer:

Question 3

Not yet answered

Marked out of 1

A hemisphere with radius 200 sits on top of a horizontal circular disk with radius 200, and the hemisphere and disk have the same center. Let $\mathcal{T}$ be the region of points P in the disk such that a sphere of radius 42 can be placed on top of the disk at P and lie completely inside the hemisphere. The area of $\mathcal{T}$ divided by the area of the disk is $\frac{p}{q}$, where p and q are relatively prime positive integers. Find $p+q$.

Answer:

Question 4

Not yet answered

Marked out of 1

Find the number of integers less than or equal to 100 that are equal to $a+b+ab$ for some choice of distinct positive integers a and b.

Answer:

Question 5

Not yet answered

Marked out of 1

A plane contains points A and B with $AB=1$. Point A is rotated in the plane counterclockwise through an acute angle θ around point B to a point A'. Point B is rotated across a angle of θ around point A' clockwise to a point B'. $AB'=\frac{4}{3}$. If $\cos\theta=\frac{m}{n}$ where m and n are relatively prime positive integers, find $m+n$.

Answer:

Question 6

Not yet answered

Marked out of 1

The product of all positive real numbers x satisfying the equation

$$\sqrt[20]{x^{\log_{2026} x}} = 26x$$

is an integer P. Find the number of positive integer divisors of P.

Answer:

Question 7

Not yet answered

Marked out of 1

Find the number of functions π mapping the set $A = \{1, 2, 3, 4, 5, 6\}$ onto A such that for every $a \in A$,

$$\pi(\pi(\pi(\pi(\pi(\pi(a)))))) = a.$$

Answer:

Question 8

Not yet answered

Marked out of 1

Let N be the number of positive integer divisors of 17017^{17} that leave a remainder of 5 upon division by 12. Find the remainder when N is divided by 1000.

Answer:

Question 9

Not yet answered

Marked out of 1

Joanne has a blank fair six-sided die and six stickers each displaying a different integer from 1 to 6. Joanne rolls the die and then places the sticker labeled 1 on the top face of the die. She then rolls the die again, places the sticker labeled 2 on the top face, and continues this process to place the rest of the stickers in order. If the die ever lands with a sticker already on its top face, the new sticker is placed to cover the old sticker. Let p be the conditional probability that at the end of the process exactly one face has been left blank, given that all the even-numbered stickers are visible on faces of the die. Then p can be written as $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m + n$.

Answer:

Question 10

Not yet answered

Marked out of 1

Let $\triangle ABC$ have side lengths $AB = 13$, $BC = 14$, and $CA = 15$. Triangle $\triangle A'B'C'$ is obtained by rotating $\triangle ABC$ about its circumcenter so that $\overline{A'C'}$ is perpendicular to $\overline{BC}$, with A' and B not on the same side of line $B'C'$. Find the integer closest to the area of hexagon $AA'CC'BB'$.

Answer:

Question 11

Not yet answered

Marked out of 1

The integers from 1 to 64 are placed in some order into an 8×8 grid of cells with one number in each cell. Let $a_{i,j}$ be the number placed in the cell in row i and column j, and let M be the sum of the absolute differences between adjacent cells. That is,

$$M = \sum_{i=1}^{8} \sum_{j=1}^{7} (|a_{i,j+1} - a_{i,j}| + |a_{j+1,i} - a_{j,i}|).$$

Find the remainder when the maximum possible value of M is divided by 1000.

Answer:

Question 12

Not yet answered

Marked out of 1

Triangle $\triangle ABC$ lies in plane $\mathcal{P}$ with $AB = 6$, $AC = 4$, and $\angle BAC = 90^\circ$. Let D be the reflection across $\overline{BC}$ of the centroid of $\triangle ABC$. Four spheres, all on the same side of $\mathcal{P}$, have radii 1, 2, 3, and r and are tangent to $\mathcal{P}$ at points A, B, C, and D, respectively. The four spheres are also each tangent to a second plane $\mathcal{T}$ and are all on the same side of $\mathcal{T}$. The value of r can be written as $\frac{m}{n}$, where m and n are relatively prime positive integers. Find $m+n$.

Answer:

Question 13

Not yet answered

Marked out of 1

For each nonnegative integer r less that 502, define

$$S_r = \sum_{m \geq 0} \binom{10,000}{502m + r},$$

where $\binom{10,000}{n}$ is defined to be 0 when $n > 10,000$. That is, S_r is the sum of all the binomial coefficients of the form $\binom{10,000}{k}$ for which $0 \leq k \leq 10,000$ and $k - r$ is a multiple of 502. Find the number of integers in the list $S_0, S_1, S_2, \dots, S_{501}$ that are multiples of the prime number 503.

Answer:

Question 14

Not yet answered

Marked out of 1

In an equiangular pentagon, the sum of the squares of the side lengths equals 308, and the sum of the squares of the diagonal lengths equals 800. The square of the perimeter of the pentagon can be expressed as $m\sqrt{n}$, where m and n are positive integers and n is not divisible by the square of any prime. Find $m+n$.

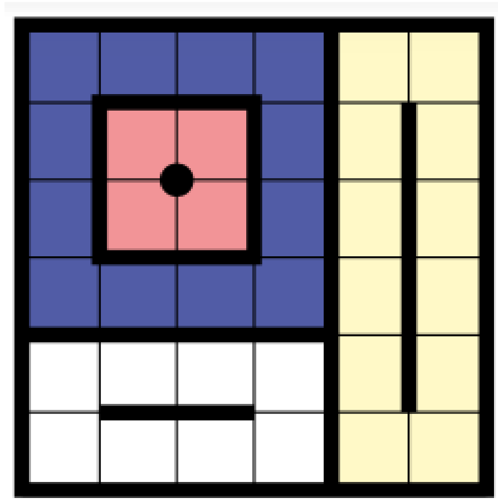
Answer:

Question 15

Not yet answered

Marked out of 1

Let a, b, and n be positive integers with both a and b greater than or equal to 2 and less than or equal to $2n$. Define an $a \times b$ *cell loop* in a $2n \times 2n$ grid of cells to be the $2a + 2b - 4$ cells that surround an $(a-2) \times (b-2)$ (possibly empty) rectangle of cells in the grid. For example, the following diagram shows a way to partition a 6×6 grid of cells into 4 cell loops.



Find the number of ways to partition a 10×10 grid of cells into 5 cell loops so that every cell of the grid belongs to exactly one cell loop.

Answer: