

Problem 24

Three distinct segments are chosen at random among the segments whose end-points are the vertices of a regular 12-gon. What is the probability that the lengths of these three segments are the three side lengths of a triangle with positive area?

一个正十二边形的顶点两两相连所形成的所有线段中，任意选择 3 根不同的线段（这 3 条线段中可能存在等长的线段），问这三根线段能够组成一个面积为正的三角形的概率是多少？

- (A) $\frac{553}{715}$ (B) $\frac{443}{572}$ (C) $\frac{111}{143}$ (D) $\frac{81}{104}$ (E) $\frac{223}{286}$

Problem 25

Let $f : \mathbb{C} \rightarrow \mathbb{C}$ be defined by $f(z) = z^2 + iz + 1$. How many complex numbers z are there such that $\text{Im}(z) > 0$ and both the real and the imaginary parts of $f(z)$ are integers with absolute value at most 10?

f 是定义在复数域上的一个函数， $f : \mathbb{C} \rightarrow \mathbb{C}$ ，且 $f(z) = z^2 + iz + 1$ ，有多少个这样的复数 z 存在，满足 $\text{Im}(z) > 0$ (z 的虚部大于 0)，且 $f(z)$ 的实部和虚部都是绝对值至多为 10 的整数？

- (A) 399 (B) 401 (C) 413 (D) 431 (E) 441