

Tiebreaker, Division A

Division A, 15 Minutes, Individual

1. Compute

$$\left\lfloor 100 \sum_{n=0}^{\infty} \arctan \left(\frac{1}{n^2 + n + 1} \right) \right\rfloor.$$

Answer: 157 (*Proposed by: Neil Dixit*)

2. Find the number of possible integer values of

$$2025 \left(\frac{\text{lcm}(x, y)}{x + y} \right).$$

Answer: 1012 (*Proposed by: Alex Tsagaan*)

3. Let triangle ABC with $\angle BAC \geq 120^\circ$ be inscribed in a circle with radius 34 and center O . Let E be the intersection between (ABC) and the altitude from A onto BC , and let F be the point on (ABC) such that EF is parallel to BC . Given that AOC is equilateral and $\cos(\angle BCF) = \frac{8}{17}$, the area of triangle BEF can be expressed as $a\sqrt{b} - c$, where a, b , and c are positive integers and b is square-free. Find $a + b + c$.

Answer: 1173 (*Proposed by: Alex Tsagaan*)
