2025 WSMO Tiebreaker Round

SMO Team

Tiebreaker Round Problem 1: Find the sum of the digits of $2499^2 + 2501^2$.

Tiebreaker Round Problem 2: In a regular hexagon, a beam of light is shot from one vertex of the hexagon. It bounces around inside the hexagon until it hits a vertex of the hexagon. How many angles can the light be shot at such that it bounces off at most three sides before hitting a vertex?

Tiebreaker Round Problem 3: In $\triangle ABC$, D is the midpoint of $\overline{AB}$. The perpendicular bisector of $\overline{BC}$, the altitude from B to $\overline{AC}$, and line CD are concurrent. If $\angle BAC = 3\angle DCB$, the value of $\cos(\angle DCB)$ can be written as $\frac{\sqrt{m}+\sqrt{n}}{p}$. Find $m+n+p$.