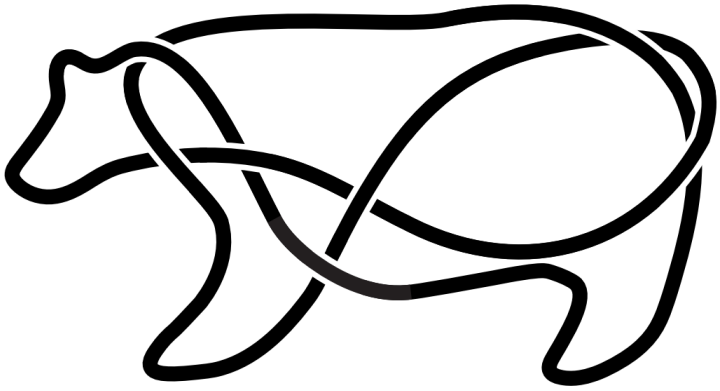
Berkeley Math Tournament 2025

Geometry Tiebreaker



November 8, 2025

Time limit: 15 minutes.

Instructions: This tiebreaker contains 3 short answer questions. All answers must be expressed in simplest form unless specified otherwise. You will submit answers to the problem as you solve them, and may solve problems in any order. You will not be informed whether your answer is correct until the end of the tiebreaker. You may submit multiple times for any of the problems, but **only the last submission for a given problem will be graded**. The participant who correctly answers the most problems wins the tiebreaker, with ties broken by the time of the last correct submission.

No calculators. Protractors, rulers, and compasses are permitted.

- Carry out any reasonable calculations. For instance, you should evaluate $\frac{1}{2} + \frac{1}{3}$, but you do not need to evaluate large powers such as 7^8.
- Write rational numbers in lowest terms. Decimals are also acceptable, provided they are exact. You may use constants such as π in your answers.
- Move all square factors outside radicals. For example, write $3\sqrt{7}$ instead of $\sqrt{63}$.
- Denominators do *not* need to be rationalized. Both $\frac{\sqrt{2}}{2}$ and $\frac{1}{\sqrt{2}}$ are acceptable.
- Do not express an answer using a repeated sum or product.
- For fractions, both improper fractions and mixed numbers are acceptable.

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1. The minute hand of a circular clock reaches from the center of the clock to the edge, and the hour hand is half as long as the minute hand. The circumference of the clock is 24π. What is the area of the triangle formed by the hour hand and minute hand at 4:30 AM?

2. Points A and B lie in the plane so that $AB = 1$. Compute the area of the region of the plane consisting of all points C such that $\angle ACB \geq 60^\circ$.

3. In triangle $\triangle ABC$ with circumcircle ω, point M is the midpoint of side $\overline{BC}$ and $AB < AC$. Line $\overleftrightarrow{AM}$ intersects ω at $D \neq A$. Let X and Y be points on ω such that $\overline{BX}$ and $\overline{CY}$ bisect $\overline{AM}$. Given $AM = 40$, $MD = 10$, and $BX = 50$, find CY.