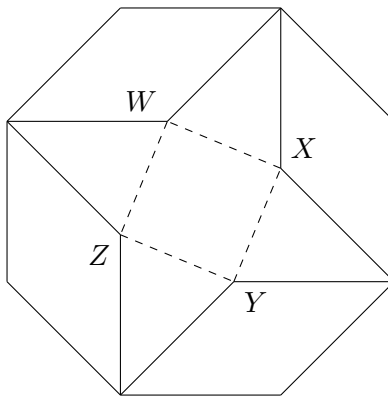


Time limit: 15 minutes.

Instructions: This tiebreaker contains 3 short answer questions. 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.

- Points $W, X, Y,$ and Z are chosen inside a regular octagon so that four congruent rhombuses are formed, as shown in the diagram below. If the side length of the octagon is 1, compute the area of quadrilateral $WXYZ$.



- Triangle $\triangle ABC$ has $\angle ABC = \angle BCA = 45^\circ$ and $AB = 1$. Let D be on \overline{AC} such that $\angle ABD = 30^\circ$. Let \overleftrightarrow{BD} and the line through A parallel to \overleftrightarrow{BC} intersect at E . Compute the area of $\triangle ADE$.
- Points $A, B,$ and C lie on a semicircle with diameter \overline{PQ} such that $AB = 3, AC = 4, BC = 5,$ and A is on \overline{PQ} . Given $\angle PAB = \angle QAC$, compute the area of the semicircle.