

**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.**

1. Pentagon  $ABCDE$  has  $AB = BC = CD = DE$ ,  $\angle ABC = \angle BCD = 108^\circ$ , and  $\angle CDE = 168^\circ$ . Find the measure of angle  $\angle BEA$  in degrees.
2. On each edge of a regular tetrahedron, five points that separate the edge into six equal segments are marked. There are twenty planes that are parallel to a face of the tetrahedron and pass through exactly three of the marked points. When the tetrahedron is cut along each of these twenty planes, how many new tetrahedrons are produced?
3. Three cities that are located on the vertices of an equilateral triangle with side length 100 units. A missile flies in a straight line in the same plane as the equilateral triangle formed by the three cities. The radar from City  $A$  reported that the closest approach of the missile was 20 units. The radar from City  $B$  reported that the closest approach of the missile was 60 units. However, the radar for city  $C$  malfunctioned and did not report a distance. Find the minimum possible distance for the closest approach of the missile to city  $C$ .