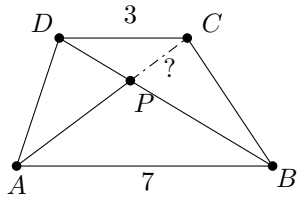
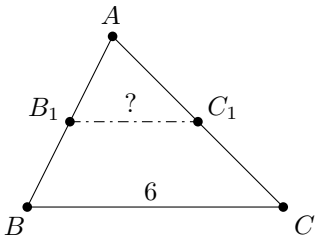
Math 340: Geometry

Homework 3

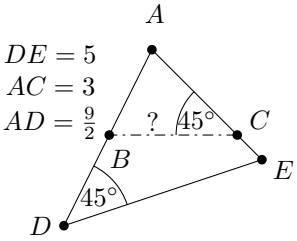
1. Exercises 2.7.2, 2.7.3, 2.7.4.
2. Exercises 2.8.1, 2.8.2 and 2.8.3.
3. Find the distances denoted by question marks in the given diagrams.

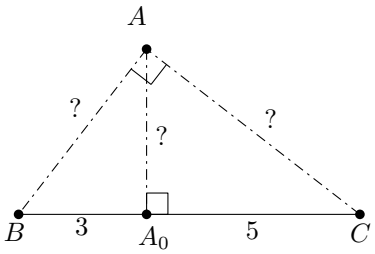


$AP = \sqrt{10}$ $AB \| CD$

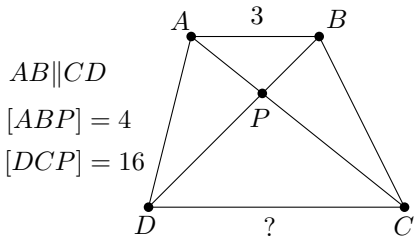


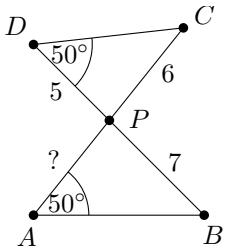
B_1, C_1 midpoints of sides

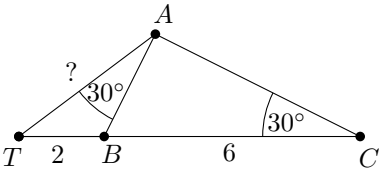


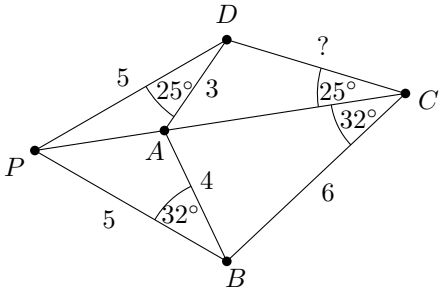


4. Find the distances denoted by question marks in the given diagrams.









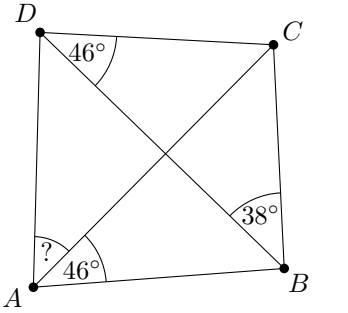
5. In a triangle ABC, a median is a line from a vertex to the midpoint of the opposite side. Prove that the three medians of $\triangle ABC$ intersect at a point G. Furthermore, show that if the medians are AD, BE, CF, then $AG = 2GD$, $BG = 2GE$, and $CG = 2GF$.

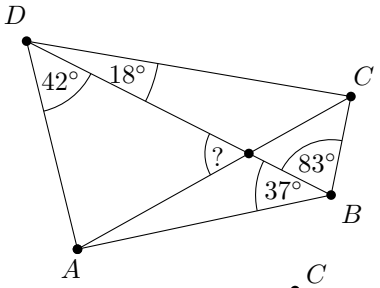
6. Let $A_1 \dots A_n$ be a regular n-gon. Find the inscribed angles corresponding to the following arcs (shorter ones):

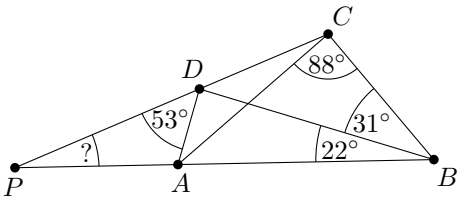
(a) $n = 4$, A_1A_2 (b) $n = 5$, A_2A_4 (c) $n = 6$, A_1A_4

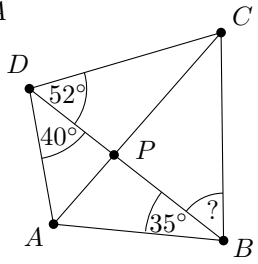
(d) $n = 12$, A_3A_7 (e) $n = 8$, A_1A_4 (f) $n = 45$, A_2A_{13}

7. Find the angles denoted by question marks in the following diagrams. Give the explanation of why those angles are correct.



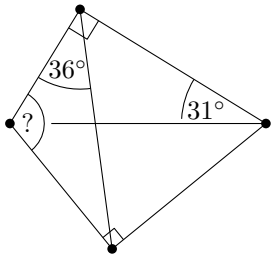


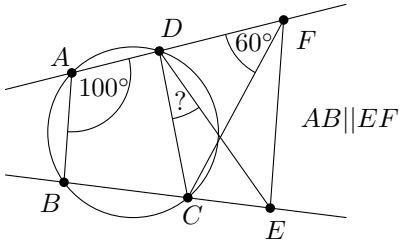


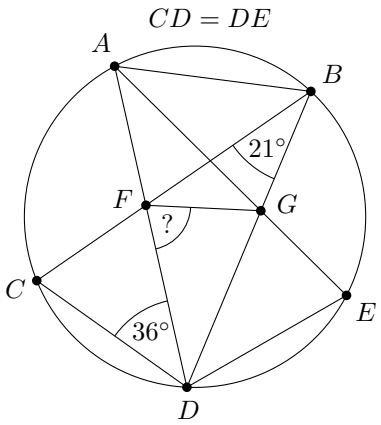


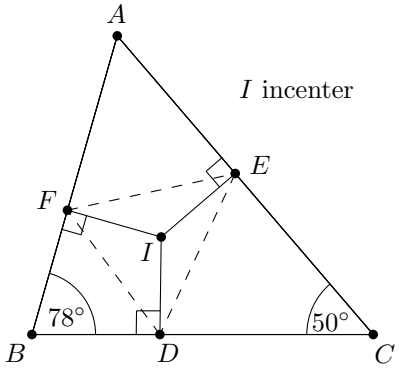
$\triangle DPC \sim \triangle APB$

8. Find the angles denoted by question marks in the following diagrams. Give the explanation of why those angles are correct.









Find internal angles in $\triangle DEF$

BONUS Let ABC be a right triangle with $\measuredangle BAC = 90^\circ$ satisfying that $BC = 10$ and $AD = 6$, where $AD \perp BC$ and D is in BC. Prove that no such triangle exists.