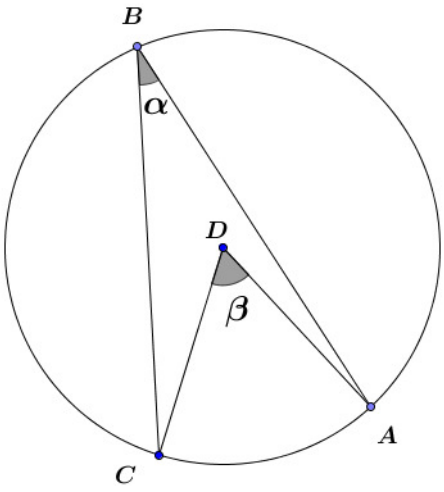
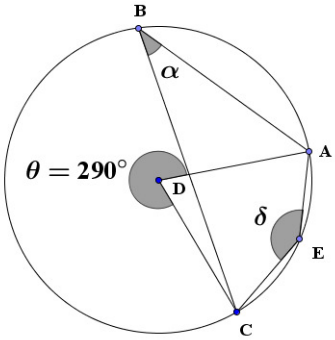
Math 490, Chapter 1 Homework (DRAFT)

1. In the figure below, ***prove*** $\alpha = \frac{1}{2}\beta$ where $\alpha = m(\angle ABC)$ and $\beta = m(\angle ADC)$. Point D is the center of the circle. You must show all details!

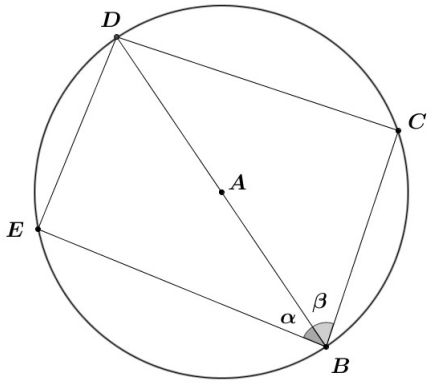


b. (4 pts) Suppose that in the figure above, where D is the center of the circle, $\alpha = 30^\circ$ and $AD = 4$. Find AC.

2. In the following figure, point D is the center of the circle. Find the missing angles. That is, find $\boldsymbol{\alpha = m(\angle CBA)}$ **and** $\boldsymbol{\delta = m(\angle AEC)}$**.**



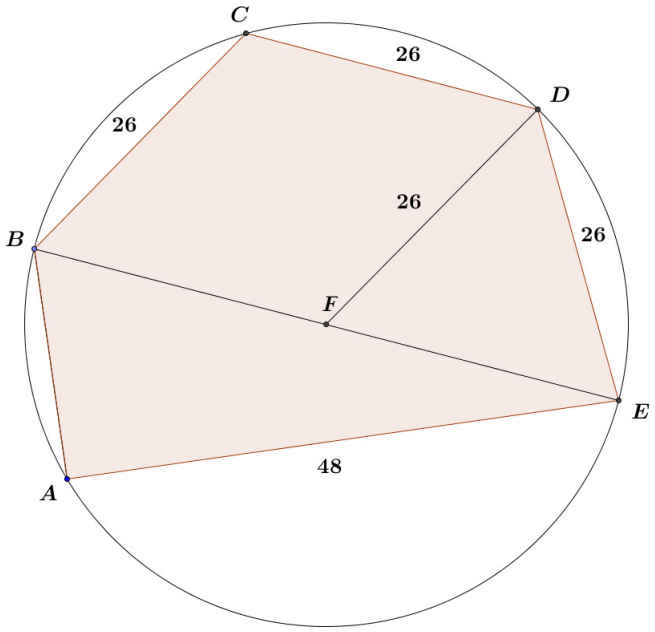
3. Use the figure below to prove $\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$. Note: point A is the center of the circle and the circle's diameter has length $BD = 1$. For full credit, be sure to show all steps and justify them! (Hint: Ptolemy's theorem should be useful.)



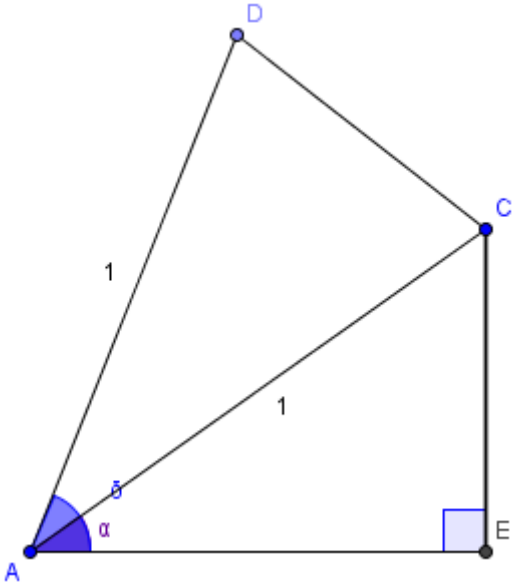
4. ***Determine whether the following statement is TRUE or FALSE. If the statement is true, prove it. If it is false, give a counterexample.***

In $\triangle ABC$ with side lengths a, b, and c, ***if*** $a^2 + b^2 = c^2$, ***then*** $\triangle ABC$ is a right triangle and the right angle is opposite the side with length c.

5. (6 pts) Find the area of pentagon $ABCDE$ shown below. The following information is given: point F is the center of the circle, $BC = CD = DE = DF = 26$ and $AE = 48$.



6a. (6 pts) In the following figure, compute the length CD two *different* ways. (Hint: Use the Law of Cosines and the distance formula.) The following lengths are given: $AD = AC = 1$. The measure of $\angle DAE$ is δ, the measure of $\angle CAE$ is α, and the measure of $\angle DAC$ is $\delta - \alpha$.



b. (3 pts) Use your work in part (a) to find a formula for $\cos(\delta - \alpha)$, where $\delta - \alpha$ is the measure of $\angle DAC$.