## MATH 8: ASSIGNMENT 19

MARCH 3, 2018

## Homework

1. Let $A, B, C$ be on a circle centered at $O$ such that $\angle A O B \cong \angle B O C \cong \angle C O A$. Prove that $\triangle A B C$ is an equilateral triangle.
2. Let $A, B$ be points on circle $\omega$ such that the central angle $\angle A O B=x^{\circ}$. What is the angle between chord $A B$ and the tangent line to the circle at $A$ ?
3. Let $M$ be a point outside the circle $\omega$, and let $l, l^{\prime}$ be two lines through $M$. Denote the points where these lines intersect the circle by $A, B$ (for $l$ ) and $A^{\prime}, B^{\prime}$ (for $l^{\prime}$ ).

Prove that triangles $M A B^{\prime}$ and $M B A^{\prime}$ have the same angles. Is it true that they are congruent?
4. Let $A, B, C, D$ be points on circle $\omega$ that form a quadrilateral. Prove that $m \angle A B C+m \angle A D C$. We call such a quadrilateral a cyclic quadrilateral: it is inscribed in a circle.
5. Let $\triangle A B C$ be an isosceles triangle with base $\overline{A C}$ whose perpendicular bisectors meet at point $O$. Prove that $\angle B O A \cong \angle B O C$.
6. Given points $A, B$, what is the locus of points $C$ such that $m \angle A C B=x^{\circ}$ for some number $x$ ?
7. Construct a right triangle, using a straightedge and compass, if you are given the length of its hypotenuse and the altitude from the right angle.

