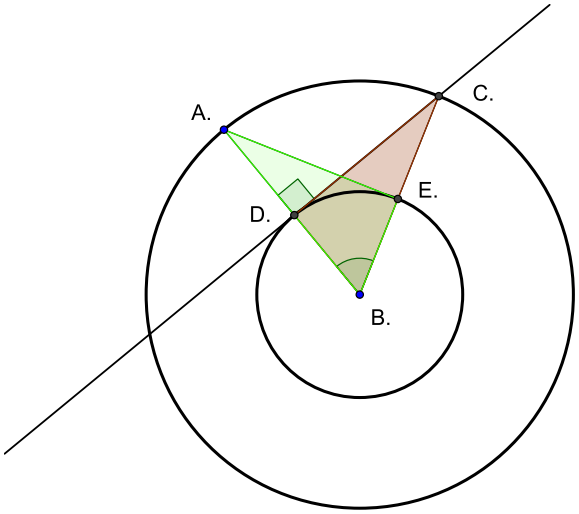
# MT 453 Elements Day 15

Speaker: Matt MacDonald and class
Scribes: Mark Reeder, Dan Moresco

February 20, 2009

**Proposition III.17**

*From a given point to draw a straight line tangent to a given circle*




Let $A$ be a point outside of a given circle with center $B$.
Draw $AB$ and let $D$ be the point where $AB$ meets the given circle.
Draw the larger circle with center $B$ and radius $BA$.
Draw the perpendicular to $AB$ through $D$, meeting the larger circle in $C$.
Draw $CB$, cutting the given circle at $E$.
Draw $AE$.
Claim: $AE$ is tangent to the given circle.
Since $\angle ABE = \angle CBD$ and $BD = BE$ and $BA = BC$, we have $\triangle AEB \simeq \triangle CDB$. [I.8]
Since $CD \perp AB$, we have $\angle CDB = \lrcorner$.
Therefore $\angle AEB = \lrcorner$, so $AE$ touches the given circle. [III.16 porism]
Q.E.D.