Name: ______________________________ **Quiz 2**

Math 331 Foundations of Geometry – Crawford **08 October 2015**

Books, calculators, and notes (in any form) are <u>not</u> are allowed. Show all your work for credit. ***Good luck!***

1. (10 pts) Determine whether the following statements are TRUE or FALSE. If it is false, give a counterexample or sketch a picture, to show why it is false.

(a). Let A, B, and C be three noncollinear points. A ray $\overrightarrow{AD}$ is an angle bisector of $\angle BAC$ if $\mu(\angle BAD) = \mu(\angle DAC)$.

(b). Two angles $\angle BAC$ and $\angle EDF$ are equal if $\mu(\angle BAC) = \mu(\angle EDF)$.

(c). If A, B, C and D are four distinct points such that C and B are on opposite sides of $\overleftrightarrow{AD}$ and $\mu(\angle BAD) < \mu(\angle BAC)$, then D is in the interior of $\angle BAC$.

(d). The measure μ of obtuse angles satisfies $90 < \mu \leq 180$.

<u>AXIOM 5 THE PROTRACTOR POSTULATE</u>

For every angle $\angle BAC$ there is a real number $\mu = \mu(\angle BAC)$ called the measure of $\angle BAC$ such that

1. $0^\circ \leq \mu^\circ < 180^\circ$.

2. $\mu = 0^\circ$ iff $\overrightarrow{AB} = \overrightarrow{AC}$.

3. For each real number r where $0^\circ < r^\circ < 180^\circ$ and for each of the two half-planes determined by $\overleftrightarrow{AB}$, there exists a unique ray $\overrightarrow{AE}$ such that E is in the half-plane and $\mu(\angle BAE) = r^\circ$. (Angle-Construction Postulate)

4. If the ray $\overrightarrow{AD}$ is between the rays $\overrightarrow{AB}$ and $\overrightarrow{AC}$, then $\mu(\angle BAD) + \mu(\angle DAC) = \mu(\angle BAC)$. (Angle Addition Postulate)

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2. (10 pts) Theorem: If $\angle BAC$ and $\angle EDF$ are distinct angles such that $\mu(\angle BAC) < \mu(\angle EDF)$, then there exists a unique ray $\overrightarrow{DG}$ such that $\overrightarrow{DE} * \overrightarrow{DG} * \overrightarrow{DF}$ and $\mu(\angle BAC) = \mu(\angle EDG)$.

(a). Sketch a diagram for this theorem.

(b). Prove the theorem using only the Protractor Postulates and Betweenness for Rays.