Name: _____ **Quiz 3**

Math 331 Foundations of Geometry – Crawford **12 November 2015**

Books, calculators, and notes (in any form) are not are allowed for problems #1-2. You may use your book for the proof of #3 – but you must turn in problems #1-2 first. Show all your work for credit. ***Good luck!*** Note: Scores will be scaled to 20 points after grading.

1. (8 pts) Let $A * C * E$. Also let B and D be on opposite sides of $\overleftrightarrow{AC}$ with $B * C * D$. If $\mu(\angle BCE = 120^\circ)$ and $\mu(\angle BAC) = 15^\circ$, then
[Sketch a picture.]

(a). Fill in the blank or explain why there is not enough information to determine: $\mu(\angle ACB) =$ _____

(b). Fill in the blank or explain why there is not enough information to determine: $\mu(\angle ACD) =$ _____

(c). True or False or Not Enough Info to Determine: If $\mu(\angle CED) = 15^\circ$, then $\overleftrightarrow{AB} \parallel \overleftrightarrow{DE}$.

(d). True or False or Not Enough Info to Determine: $\mu(\angle ABC) = 105^\circ$.

2. (8 pts) Recall the definition of semiparallel: The opposite sides $\overline{AB}$ and $\overline{CD}$ of a quadrilateral $\square ABCD$ are ***semiparallel*** if $\overline{AB} \cap \overleftrightarrow{CD} = \emptyset$ and $\overline{CD} \cap \overleftrightarrow{AB} = \emptyset$.

(a). Sketch a picture of a quadrilateral where $\overline{AB}$ and $\overline{CD}$ are semiparallel, but $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are not parallel.
Sketch subpicture(s) demonstrating how your quadrilateral satisfies the definition ($\overline{AB} \cap \overleftrightarrow{CD} = \emptyset$ and $\overline{CD} \cap \overleftrightarrow{AB} = \emptyset$).

(b). Sketch a picture of a quadrilateral where $\overline{AB}$ and $\overline{CD}$ are not semiparallel, and $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are not parallel.
Sketch subpicture(s) demonstrating how your quadrilateral violates the definition ($\overline{AB} \cap \overleftrightarrow{CD} = \emptyset$ and $\overline{CD} \cap \overleftrightarrow{AB} = \emptyset$).

(c). True or False: If $\overline{AB}$ and $\overline{CD}$ are semiparallel, then $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are parallel.

(d). True or False: If $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are parallel, then $\overline{AB}$ and $\overline{CD}$ are semiparallel.

If you wish to use your book, you must turn in problems #1-2 first.

THEOREM (Saccheri-Legendre Theorem). If $\triangle ABC$ is any triangle, then $\sigma(\triangle ABC) \leq 180°$.

3. (8 pts) Prove the following ***corollary*** to the Saccheri-Legendre Theorem.

COROLLARY . The sum of the measures of two interior angles of a triangle is less than or equal to the measure of their remote exterior angle.