Test 3 Name:______________________

Show your work! Answers that do not have a justification will receive no credit.

1. (20 points) Are the following true or false and give a short reason.

   (a) If two triangles have the same angle sum, then they are congruent.

   (b) In neutral geometry it is possible to prove that for any segment $\overline{AB}$ that there are three points M_1, M_2, and M_3 so that $A * M_1 * M_2, * M_3 * B$ and $\overline{AM_1} \cong \overline{M_1M_2} \cong \overline{M_2M_3} \cong \overline{M_3B}$.

(c) In neutral geometry it is impossible to prove that given a point line ℓ and a point P not on ℓ that there is a least one line through P and parallel to ℓ.

(d) In neutral geometry it is possible to prove the (ASS) criterion for congruence of triangles. (That is if $\triangle ABC$ and $\triangle A'B'C'$ have $\sphericalangle A \cong \sphericalangle A'$, $\overline{AB} \cong \overline{A'B'}$ $\overline{BC} \cong \overline{B'C'}$ then $\triangle ABC \cong \triangle A'B'C'$.)

2. (20 points) Prove that two right triangles are congruent if the hypotenuse and a leg of one are congruent respectively to the hypotenuse and leg of the other.

3. (20 points) Prove that any segment $\overline{AB}$ has a midpoint. (You do not have to prove uniqueness.)

4. (20 points) Let $\triangle ABC$ be given and let $B * P * C$. Then show that $\triangle ABC$ has angle sum 180° then so does $\triangle ABP$.

5. (20 points) Let α be a circle with center A and β a circle with center $B \neq A$. Assume that α and β intersect in two points P and Q with are on opposite sides of $\overleftrightarrow{AB}$. Then prove $\overleftrightarrow{AB}$ and $\overleftrightarrow{PQ}$ are perpendicular.