Examlet 3 Advanced Geometry 4/12/19

1. a) State the Neutral Area Postulate.

   b) State the Euclidean Area Postulate.

2. A triangle has $\alpha = 36°$, $A = 6.0$, and $C = 10.0$. Solve for the remaining measurements, accurate to the nearest tenth.

3. Provide good justifications in the blanks below for the corresponding statements:

Proposition: If $\triangle ABC$ and $\triangle DEF$ are two triangles such that $\triangle ABC \sim \triangle DEF$, then

$$\frac{AB}{AC} = \frac{DE}{DF}$$

Statement:	**Reason:**
If $AB = DE$, then $\triangle ABC \cong \triangle DEF$ and the conclusion is evident.	
So suppose $AB \neq DE$. Either $AB > DE$ or $AB < DE$.	
Change notation, if necessary, so that $AB > DE$. Choose a point B' on $\overline{AB}$ such that $AB' = DE$.	
Let m be the line through B' such that m is parallel to $\ell = \overleftrightarrow{BC}$	
and let C' be the point at which m intersects $\overline{AC}$.	
Then $\angle AB'C' \cong \angle DEF$	
Then $\triangle AB'C' \cong \triangle DEF$	
Let n be the line through A that is parallel to ℓ and m.	
Then $AB'/AB = AC'/AC$ and so $DE/AB = DF/AC$.	
$DE/DF = AB/AC$ as desired.	

4. Prove that if $\square ABCD$ is a parallelogram in the Euclidean plane and diagonal $\overline{AC}$ divides the quadrilateral into congruent triangles, then the opposite sides are congruent.

5. Prove that for a Saccheri quadrilateral in the hyperbolic plane, the length of the summit must be greater than the length of the base.