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Homework H09, *Revised Version*
MATH 3110/5110
Due Friday, April 1, 2022

Problem:	**1**	**2**	**3**	**4**	**Total**	**Rescaled**
Your Score:						
Possible:	**20**	**20**	**20**	**80**	**100**	**10**

In the *Revised Version*, I removed one Suggested Exercise, changed the order of the problems, clarified the wording of problem [1], and fixed a grammatical error in problem [4].

Observe that there are 140 points possible. Any points scored over 100 will be considered Extra Credit.

***Suggested Exercises*:** 6.1 # 1, 2, 4, 5, 6, 7, 8, 9, 10, 12 (removed #13)

[1] In neutral geometry, if ΔPQR is isosceles, with $\overline{PQ} \simeq \overline{PR}$, and ray $\overrightarrow{PS}$ bisects angle $\angle QPR$, then ray $\overrightarrow{PS}$ also bisects side $\overline{QR}$. (Remark: It is not given that S is on $\overline{QR}$, so you should not assume that it is.)

(a) Illustrate the statement.

(b) Prove the statement.

[2] In a neutral geometry, if ΔPQR is an isosecles triangle with $\overline{PQ} \simeq \overline{PR}$ and T is the midpoint of $\overline{QR}$, then $\overleftrightarrow{PT} \perp \overleftrightarrow{QR}$.

(a) Illustrate the statement.

(b) Prove the statement.

[3] In a neutral geometry, if a triangle is equilateral, then it is equiangular.

(a) Illustrate the statement.

(b) Prove the statement.

[4] Prove or disprove:

(a) In a neutral geometry, in every quadrilateral $\square PQRS$ ray $\overrightarrow{RP}$ is the bisector of $\angle QRS$.

(b) In a neutral geometry, if quadrilateral $\square PQRS$ has the properties that $\overline{QP} \simeq \overline{QR}$ and that $\overrightarrow{QS}$ is the bisector of $\angle PQR$, then $\overline{SP} \simeq \overline{SR}$.

(c) In a neutral geometry, if quadrilateral $\square PQRS$ has $\overline{QP} \simeq \overline{QR}$, then $\angle P \simeq \angle R$.

(d) In a neutral geometry, if the diagonal segments of quadrilateral $\square PQRS$ intersect at a point T that is the midpoint of both diagonal segments, then $\overline{QR} \simeq \overline{SP}$.