MA 308

Homework #8

Due Thursday, April 7

1. Let $\overline{AB}$ be a line segment and P be a point not on the line $\overleftrightarrow{AB}$. Assume that P is on the perpendicular bisector of segment $\overline{AB}$. Prove that P is equidistant from the points A and B. Also, how do you modify the proof if P is on the line $\overleftrightarrow{AB}$?

2. Let $\overline{AB}$ be a line segment and P be a point not on the line $\overleftrightarrow{AB}$. Assume that P is equidistant from the points A and B. Prove that P is on the perpendicular bisector of $\overline{AB}$. Suggestion: Start by defining M to be the midpoint of $\overline{AB}$, and draw the segment $\overline{MP}$. Also, how do you modify the proof if P is on the line $\overleftrightarrow{AB}$?

3. Let ΔABC be a triangle. Assume P lies on the perpendicular bisectors of both $\overline{AB}$ and $\overline{AC}$. Use the results of the previous two problems to prove that P must also lie on the perpendicular bisector of $\overline{BC}$ (and therefore, the three perpendicular bisectors intersect in a common point). Prove also that in this case P is the center of a circle that passes through all three vertices of the triangle. Draw a picture with GeoGebra that illustrates this theorem.

4. Create your own nice repeating "wallpaper" pattern, considered as continuing forever in all directions, that has rotational symmetries of 90 degrees, reflectional symmetries, but no reflection lines that cross at 45 degree angles.

5. Create your own nice repeating "wallpaper" pattern, considered as continuing forever in all directions, that has rotational symmetries of 120 degrees, no rotational symmetries of 60 degrees, reflectional symmetries, but some centers of rotational symmetry that do not lie on reflection lines.

6. Extra Credit. The "Mozart" figure is an example of a name drawn in such a way that it admits a symmetry via 180 degree rotation. Make such a figure with your own name.

7. Exam #3 will take place on Thursday, April 14.