MATH 301/501 HOMEWORK 6–DUE AT THE BEGINNING OF CLASS ON THURSDAY, NOVEMBER 12

One goal for this course is for you to develop your skill in effectively communicating mathematics. With this in mind, you should clearly write up your solutions. A solution with little or no justification will receive little or no credit.

(1) In class students assumed the result that isometries preserve angle measure. Prove that this is true.

(2) Pick any 4 of the problems 1 - 10 from the attached excerpt from the NY State Modules, and work out your solutions. Make sure you describe the isometries–rigid motions–where appropriate.

(3) The NY Mathematics Standards ask that high school students understand congruence from the perspective of geometric transformation or, more precisely, rigid motions. In particular, students are expected to do the following:

"Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself."

Do this, describing the rotations and reflections as precisely as possible, and include a general result for a regular n-gon. For the regular n-gon, you should prove that you have found all possible rigid motions that carry it onto itself.

Problem Set

Justify whether the triangles meet the SAS congruence criteria; explicitly state which pairs of sides or angles are congruent and why. If the triangles do meet the SAS congruence criteria, describe the rigid motion(s) that would map one triangle onto the other.
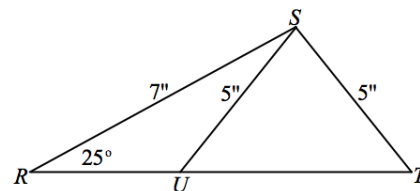
1. Given: $\overline{AB} \parallel \overline{CD}$, and $AB = CD$

    Do $\triangle ABD$ and $\triangle CDB$ meet the SAS criteria?
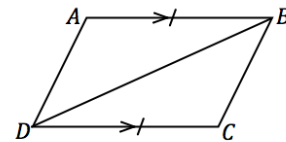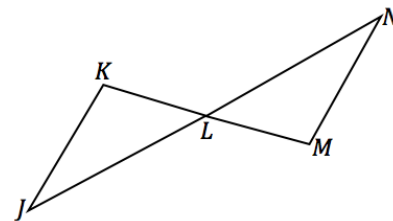
2. Given: $m\angle R = 25°$, $RT = 7"$, $SU = 5"$, and $ST = 5"$

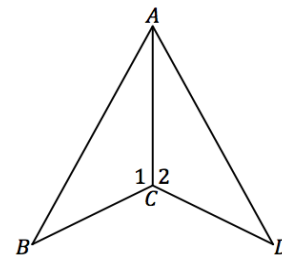   Do $\triangle RSU$ and $\triangle RST$ meet the SAS criteria?

3. Given: $\overline{KM}$ and $\overline{JN}$ bisect each other

    Do $\triangle JKL$ and $\triangle NML$ meet the SAS criteria?
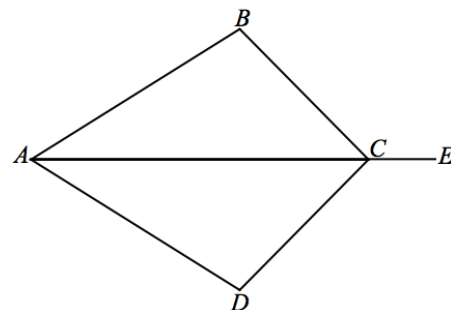
4. Given: $m\angle 1 = m\angle 2$, and $BC = DC$

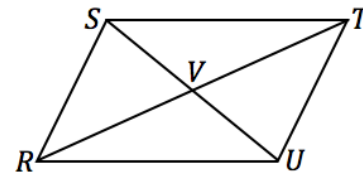   Do $\triangle ABC$ and $\triangle ADC$ meet the SAS criteria?

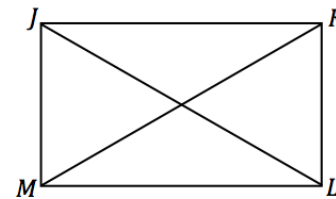5. Given: $\overline{AE}$ bisects angle $\angle BCD$, and $BC = DC$

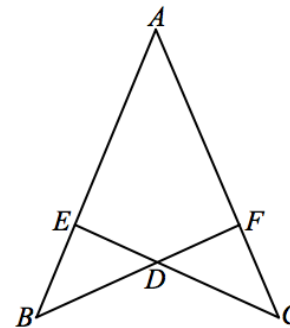   Do $\triangle CAB$ and $\triangle CAD$ meet the SAS criteria?

6. Given: $\overline{SU}$ and $\overline{RT}$ bisect each other

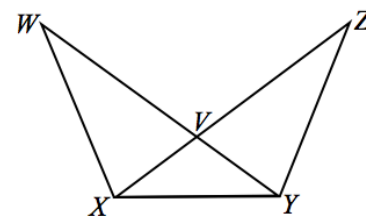   Do $\triangle\,SVR$ and $\triangle\,UVT$ meet the SAS criteria?

7. Given: $JM = KL, \overline{JM} \perp \overline{ML},$ and $\overline{KL} \perp \overline{ML}$

    Do $\triangle\,JML$ and $\triangle\,KLM$ meet the SAS criteria?

8. Given: $\overline{BF} \perp \overline{AC},$ and $\overline{CE} \perp \overline{AB}$

    Do $\triangle\,BED$ and $\triangle\,CFD$ meet the SAS criteria?

9. Given: $m\angle VXY = m\angle VYX$

    Do $\triangle\,VXW$ and $\triangle\,VYZ$ meet the SAS criteria?

10. Given: $\triangle\,RST$ is isosceles, with $RS = RT,$ and $SY = TZ$

    Do $\triangle\,RSY$ and $\triangle\,RTZ$ meet the SAS criteria?