Honors 213   Spring 2005   Homework 09

Due April 5

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Name

For this homework set you are allowed to work with other members of either of the geometry classes. However, must cite everyone with whom you have discussed your problem.
In addition, you may **NOT** consult with anyone (except me) when you write your paper explaining your problem(s).

"The difference between genius and stupidity is that genius has its limits." – Anonymous
"Obvious" is the most dangerous word in mathematics." – Eric Temple Bell

Problems

Remember that you may use any previous problem as part of the justification for your problem(s).

1. **(Sarah, Jane)** Do exercises 5 and 6 of Chapter 5.
2. (**Jana, Chelsea**) Do exercise 7 of Chapter 5.
3. **(Eric, Alec)** Do exercise 9 of Chapter 5.
4. **(Bryan)** Note the following about exercise 10 of Chapter 5.

   There is only one step of the proof that cannot be justified using what we already know. For an example of a step that **can be** justified, consider the claim that there is a ray $\overrightarrow{PX}$ of n that is between $\overleftrightarrow{PQ}$ and a ray of m. This is valid since on n there are points R, S satisfying $Z * P * X$. Hence one of Z and X is on the same side of m as Q. Relabel if necessary so this point is X. Another use of the opposite side lemma using $A * P * B$ on line $m = \overleftrightarrow{AB}$ tells us that one of A and B is on the same side of $\overleftrightarrow{PQ}$ as X. Call this point B. We now know that X is interior to angle $\angle BPQ$. That is, ray $\overrightarrow{PX}$ of n is between ray $\overrightarrow{PQ}$ and ray $\overrightarrow{PB}$ of m as claimed.

   The step that is left unjustified is the claim that "Hence, Y eventually reaches a position Y' on $\overrightarrow{PQ}$ such that $PY' > PQ$."

   It is justifiable that the segments PX and XY both grow without bound as " X recedes endlessly on ray $\overrightarrow{PX}$. As plausible as this seems, exercise 5 shows that doubling lengths on ray $\overrightarrow{PX}$ does not double lengths on ray $\overrightarrow{PQ}$. Thus the intuitively reasonable claim that segments PY' grow without bound (and hence get bigger than PQ) has not been justified by any of our results.
5. **(Emily, Kristen)** Do exercise 11 of Chapter 5.
6. **(Everyone)** Note that all of the exercises referenced in this problem are in **Euclidean** geometry.
   (a) Understand what exercise 18 and 20 are telling you about similar triangles in Euclidean geometry.
   (b) Be able to prove exercises 24, 25, and 26 of Chapter 5.