

MATH 515

First Midterm

October 8, 2014

Name: _____ ID: _____

Question:	1	2	3	4	5	Total
Points:	15	15	15	15	15	75
Score:						

There are 5 problems on 5 pages in this exam (not counting the cover sheet). Make sure that you have them all.

Do all of your work in this exam booklet, and cross out any work that the grader should ignore. You may use the backs of pages, but indicate what is where if you expect someone to look at it. **Books, extra papers, and discussions with friends are not permitted.** If you wish to use your psychic abilities to read my mind for the answers, you may do so. However, remember that I may be deliberately thinking of the *wrong* answers during the test.

You have more time than I think you need, but less time than you probably want, to complete this exam.

When you complete this exam, if there is sufficient time it is strongly recommended that you go back and reexamine your work, both on this exam and in your life up until now, for any errors that you may have made.

5 pts. 1. (a) Give the definition of a **circle** with center O and radius r .

5 pts. (b) Give the definition of the **interior** of a triangle.

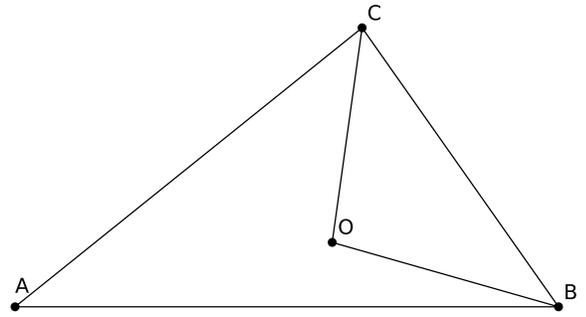
5 pts. (c) Give the definition of the **altitude** of $\triangle ABC$ with base \overline{BC} .

15 pts.

2. Given a segment \overline{BC} , what is the locus of points which are the vertex A of a triangle $\triangle ABC$ with base \overline{BC} and $\angle B \geq \angle C$?

15 pts.

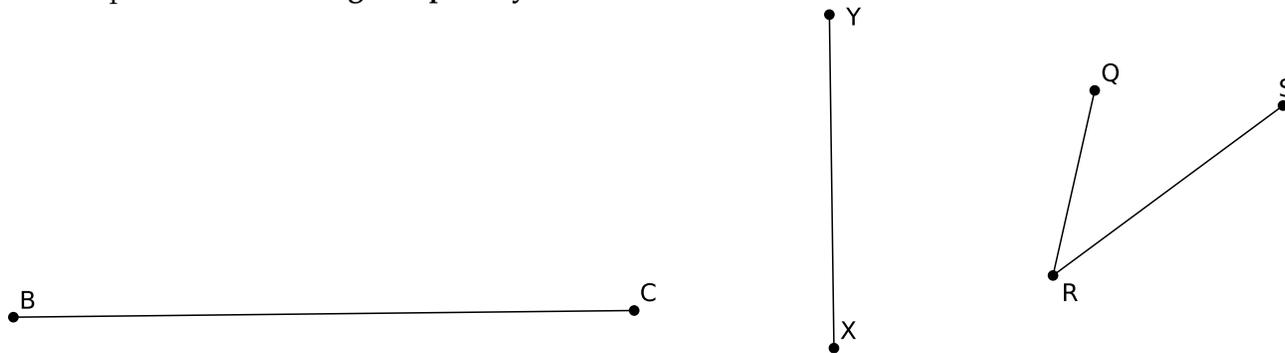
3. Given $\triangle ABC$ with a point O in its interior, prove that $|CO| + |BO| < |AC| + |AB|$.



15 pts.

4. Given a segments \overline{BC} and \overline{XY} , and an angle QRS , construct a triangle with base \overline{BC} , altitude congruent to \overline{XY} and $\angle B \cong \angle QRS$.

You may assume that you have a movable compass, can draw lines between points, can drop or erect perpendiculars to a given line, and find midpoints of segments. Other constructions need to be specified. **Don't forget to prove your construction works!**



15 pts.

5. On $\triangle ABC$, points D , E , and F are the midpoints of sides \overline{AB} , \overline{BC} , and \overline{AC} , respectively. ($\triangle DEF$ is called the *medial triangle*.) Prove that all four small triangles are congruent.

