Honors 213 **Spring 2003** **Exam 2**

____
Name

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use a text or notes or technology. Include a careful sketch of any graph obtained by technology in solving a problem. **Only write on one side of each page.**

Problems

1. (20 points) Using any previous results, prove part (b) of Proposition 3.21. Given angles $\measuredangle P, \measuredangle Q, \measuredangle R$. If $\measuredangle P < \measuredangle Q$ and $\measuredangle Q \cong \measuredangle R$, then $\measuredangle P < \measuredangle R$.

2. (20 points) Using any previous results, prove the following portion of Proposition 4.3.Every segment has a midpoint (do NOT show the midpoint is unique).

3. (20 points each) Do any three (3) of the following.

   (a) In the following interpretation, all incidence axioms and the first two betweenness axioms hold. Explain why betweenness axiom 3 fails. Use the usual Euclidean model except interpret the betweenness relation $A * B * C$ to mean "B is the midpoint of segment AC".

   (b) In the figure on the blackboard, the pairs of angles $(\measuredangle A'B'B'', \measuredangle ABB'')$ and $(\measuredangle C'B'B'', \measuredangle CBB'')$ are called pairs of **corresponding** angles cut off on l and l' by transversal t.Prove corresponding angles are congruent if and only if alternate interior angles are congruent.

   (c) Using any result through Chapter 4 prove the following. Let γ be a circle with center O, and let A and B be two points on γ. The segment AB is called a **chord** of γ. Let M be the midpoint of segment AB. Prove that if $O \neq M$, then $\overleftrightarrow{OM}$ is perpendicular to $\overleftrightarrow{AB}$.

   (d) Using any result through the corollaries to Theorem 4.3, prove the following.
   If $A * B * C$ and $\overleftrightarrow{DC} \perp \overleftrightarrow{AC}$ then $AD > BD > CD$. (See the figure on the board.)