Test 1 Name:______________________

Show your work! Answers that do not have a justification will receive no credit.

1. (10 points) Write the negations of the following statements:

   (a) All crows are good poets.

   (b) For every line ℓ there and point P not on ℓ there is at at most one line m through P and parallel to ℓ.

   (c) If some triangle has angle sum $180°$ then every triangle has angle sum $180°$.

   (d) If P then Q.

   (e) P or Q.

2. (25 points) True or false and give a short reason for your answer.

   (a) Just using the incidence axioms it is possible to prove that every line has an infinite number of points on it.

   (b) Using the both the incidence axioms and the betweenness axioms it is possible to prove that every line has an infinite number of points on it.

   (c) Just using the incidence axioms it is possible to prove Hilbert's parallel axiom.

(d) If $A * B * D$ and $A * C * D$ then $B * C * D$.

(e) Whenever a conditional statement is valid, its converse is valid.

3. (10 points) Give a model that show that the first incidence axiom is independent of the other betweenness axioms.

4. (15 points) Use the incidence axioms to show that every point has at least two line through it.

5. (20 points) Use the incidence axioms and the betweenness axioms to prove that if m is parallel to ℓ then all the points of m are on the same side of ℓ.

6. (20 points)Let A, B, and C be points on the line ℓ so that $A * B * C$ and let $m \neq l$ be a line through C. Then prove that A and B are on the same side of m.