

Name: _____

Math 403 - Test #1 - February 16, 2007

Time: 50 minutes. Write your answers on the blank paper provided. Start a new page for each problem and be sure to number the problems. You may not use any books or notes. There are 100 points possible.

1. (5 points each part) Give the definition of each of the following. You should give the definition used in our textbook.
 - (a) Parallel lines
 - (b) Parallelogram
 - (c) Median of a triangle
 - (d) Barycentric coordinates of a point P

2. (10 points each part)
 - (a) What is an axiomatic system?
 - (b) List Euclid's five postulates.

3. (20 points) Prove that the midpoints of a triangle are concurrent.

4. (12 points) Let A, B, C, D be arbitrary points. Define M_1 as the midpoint of A and B , M_2 as the midpoint of B and C , M_3 as the midpoint of C and D , and M_4 as the midpoint of D and A . Prove that M_1, M_2, M_3, M_4 define a parallelogram.

5. (12 points) In $\triangle ABC$, let B' be the midpoint of A and C , C' the midpoint of A and B . Prove that $\ell_{B'C'}$ is parallel to ℓ_{BC} and that the length of $B'C'$ is half the length of BC .

6. (4 points each part) Answer True or False for each part. You do not need to give an explanation and there is no partial credit.
 - (a) The barycentric coordinates of the centroid of $\triangle ABC$ are $a = 1/4, b = 1/4, c = 1/2$.
 - (b) In $\triangle ABC$, let C' denote the midpoint of A and B . Then the centroid of $\triangle ABC$ is $\frac{1}{3}C + \frac{2}{3}C'$.
 - (c) $P = 3A + 2B$ is a point on the line ℓ_{AB} .
 - (d) If $a + b = 1$ and a and b are both positive, then $aA + bB$ is a point on ℓ_{AB} between A and B .