

MATH 3100. Final Test: Sample.

April 22, 2003

The exam is “closed book, closed notes”.

1. Show that the sum of angles of a triangle is 180° degrees.

2. Suppose that $ABCD$ is a quadrilateral inscribed in a circle, with E being the point of intersection of diagonals; see Figure 1. Suppose that $|AE| = 1$, $|EC| = 2$, $|EB| = 2$. Compute $|ED|$. Justify your answer!

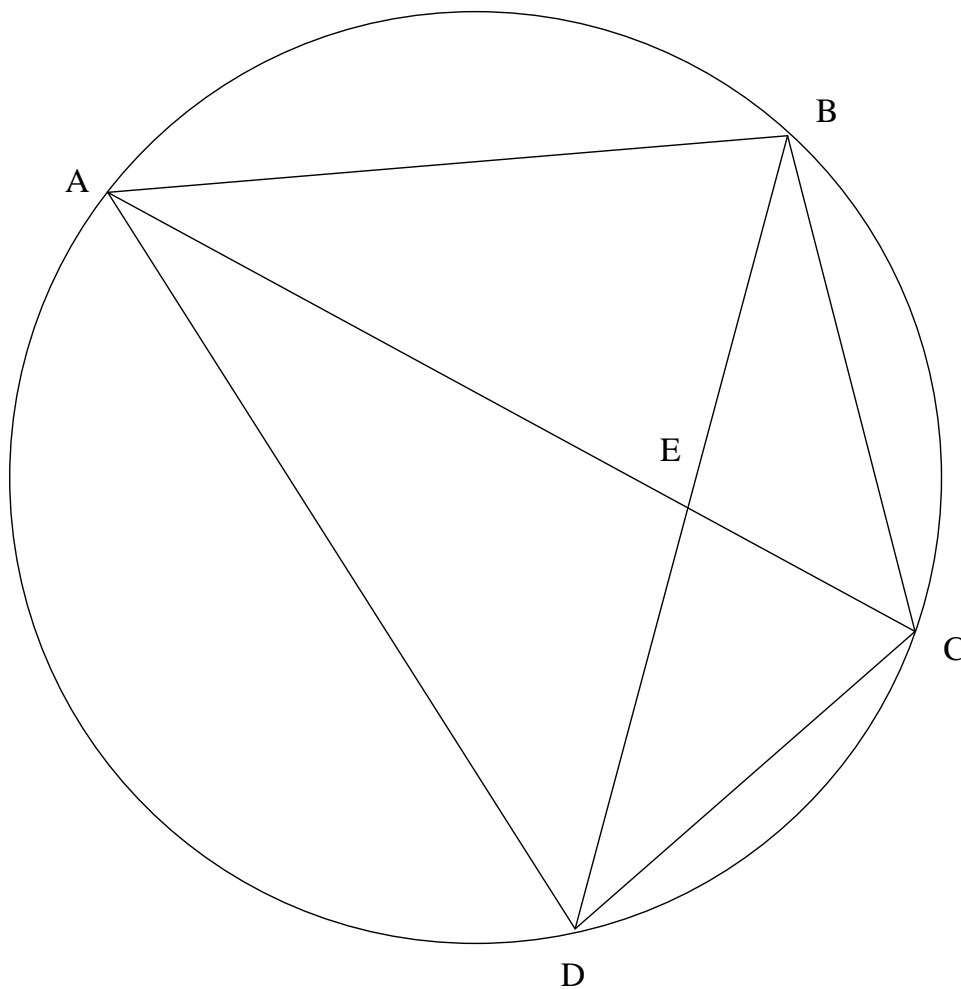


Figure 1:

3. State and prove the concurrence theorem for the side bisectors of a triangle.

4. Show that the formula $\frac{1}{2}h \times b$ for the area of a triangle holds.

5. Prove that if m is a motion of the line such that $m(0) = 0$ then either $m(x) = x$ or $m(x) = -x$.

6. Given segment of unit length in the plane, construct (using compass and ruler) a segment of the length $1/3$. Explain your solution!

7. Given points $P = (1, 2)$ and $Q = (1, -1)$ find a motion m of the plane so that $m(P) = (0, 0)$ and $m(Q) = (d, 0)$ for some $d > 0$.

8. Explain what are straight lines in the hyperbolic plane (using the unit disk model). Give an example of a point P and a line straight L in the hyperbolic plane and three distinct lines L_1, L_2, L_3 passing through P and so that L_1, L_2, L_3 are all parallel to L .