

MATH. Third Midterm Test: Sample.

April 15, 2003

The exam is “closed book, closed notes”.

1. [20 points] 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 $d > 0$.

2. [20 points] Using axioms of the plane show that given a pair of distinct points P, Q in the plane there exists a straight line L through these points.

3. [20 points] Suppose that P is an n -gon in the plane so that $n - 1$ perpendicular bisectors L_1, \dots, L_{n-1} for the sides of P cross at the same point. Show that the vertices of P belong to the same circle.

4. [20 points] State and prove the triangle inequality in the plane.

5. [20 points] Suppose that P is a pyramid whose base is the circle, height of P equals h and the angle between the axis of the pyramid and its surface equals α . See figure below. Compute the volume of P . Justify your computation!

