

NOTICE: This Material May Be Protected By
Copyright Law (Title 17, U.S. Code)

Midterm for Math131

Instructor: Andrew Shallue

Date: Thurs, Oct 21 2004

Directions

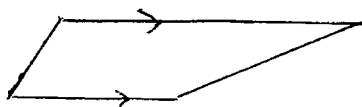
- 1). This test is worth 10 points, 2 points for each of five problems.
- 2). Make sure to fully justify each of your answers. Little to no credit will be given to answers without correct and understandable reasoning displayed. When you use a formula or theorem, make sure to mention that you are using it.
- 3). Notes and calculators are allowed.
- 4). You can assume any theorem in the back of the course packet. For constructions, you can assume the following: copy a line segment, copy an angle, multiply a line segment. All other constructions need to be explained.
- 5). For constructions, give a picture with the appropriate arcs and lines and a short written explanation of your construction.
- 6). There is no need to use compass and straightedge in a problem unless it asks you to construct.

Score:

Problem 1: What is the distance between two opposite vertices of a cube with edges of length 1 inch? Here opposite vertices would be one from a corner at the top face to the diagonally opposite corner at the bottom face. Make sure to justify your answer.
(Hint: draw a picture)

Problem 2: Can the vertex arrangement given by a regular pentagon and two regular hexagons surrounding one vertex be part of any tessellation? Make sure to justify your answer. In notation this vertex would be (5, 6, 6).

Problem 3: Tessellate the plane with the following quadrilateral. Note the quadrilateral has a pair of parallel sides, and thus is a trapezoid. Give at least two full vertex arrangements so it is obvious how the pattern continues to fill the entire plane. Make sure to justify why your tessellation works, in particular why the shapes can fit together in that way.



Problem 4: Prove the following statement using our theorems and postulates: *In an equilateral triangle, a line bisecting one of the vertex angles is also an altitude.*

Make sure your proof is complete and clear.

(Hint: draw a picture)

Problem 5: Construct (using compass and straightedge) a line perpendicular to the given line and through the point P.

Make sure your picture is clear, and give a short written description of your construction. There is no need to prove that your construction works.

P

