University of South Carolina
Math 222: Math for Elementary Educators II
Instructor: Austin Mohr
Section 002
Fall 2010

Quiz 1 (Version 2)

Due Wednesday, December 8

1. Give a short answer to each of the following and explain your reasoning. Use pictures if it helps to convey your thoughts.

a. Give an example of skew lines (actually, line segments) in real life.

b. How many lines can be determined by five points given that no three of them are collinear?

c. How many planes can be determined by five points given that no four of them are coplanar?

2. Draw a picture for each of the possibilities described below. Draw from multiple perspectives or elaborate with words it helps clarify your three-dimensional drawings. (Please give a drawing other than those appearing in the Quiz 1 solution.)

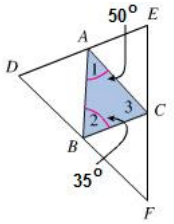
a. All four possibilities for curves that are simple/not simple, closed/not closed

b. All four possibilities for curves that are convex/concave, polygonal/not polygonal

c. All four possibilities for surfaces that are simple/not simple, closed/not closed

d. All four possibilities for surfaces that are convex/concave, polyhedral/not polyhedral

3. In the following picture, $\overleftrightarrow{DE} \| \overleftrightarrow{BC}$, $\overleftrightarrow{EF} \| \overleftrightarrow{AB}$, and $\overleftrightarrow{DF} \| \overleftrightarrow{AC}$. Find the measure of all missing angles. Show your work.



4. Using only the basic definitions of each shape, decide whether the following statements are true or false. If a statement is true, explain why it is true. If it is false, give a counterexample (with explanation) showing it is false.

a. Every right triangle is isosceles.

b. Every parallelogram is a square.

c. No kite is a rhombus.

d. If a quadrilateral is both a parallelogram and a rhombus, then it is a square.

5. A *lolbox* is a quadrilateral with three of its interior angles being right angles. The lolbox makes me lol because it is actually just another way to define rectangle.

a. Show that every lolbox is a rectangle.

b. Show that every rectangle is a lolbox.

6. A *uniform polyhedron* is any polyhedron whose faces are regular polygons (not necessarily all of the same type) and have the same number of each type of face meeting at every vertex. For example, a soccer ball is a uniform polyhedron, since all the faces are either regular pentagons or regular hexagons and there is always one pentagon and two hexagons meeting at any vertex.

a. Draw a sketch of a rectangular prism that is a uniform polyhedron.

b. Draw a sketch of the only (up to similarity) pyramid that is a uniform polyhedron.

c. How many uniform polyhedra could there be using only squares and pentagons?