Math 3305 – Version A

Final

Q1   20 points

Below are 10 statements. Each is written as though it is about one geometry, but may apply to 1, 2, or 3 geometries. Using the following codes, fill in the blank to the left of the statement indicating in which geometry/geometries the statement is true.

3   It is true in Euclidean, Spherical and Hyperbolic.
2he   It is true in both Hyperbolic and Euclidean, and not true in Spherical.
2es   It is true in both Spherical and Euclidean, and not true in Hyperbolic.
2hs   It is true in both Hyperbolic and Spherical, and not true in Euclidean.
1e   It is true only in Euclidean.
1h   It is true only in Hyperbolic.
1s   It is true only in Spherical.
0   It is not true in any of Hyperbolic, Spherical, or Euclidean.

Statements

_____ 1.   Saccheri Quadrilaterals exist.

_____ 2.   The summit angles of a Saccheri Quadrilateral are obtuse.

_____ 3.   The sum of the measures of the interior angles of a triangle is a constant.

_____ 4.   The Pythagorean Theorem is a real theorem.

_____ 5.   There are undefined terms, axioms, theorems and definitions.

_____ 6.   Biangles exist.

_____ 7.   There are circles.

_____ 8.   Lines are infinite in length.

_____ 9.   There is no axiom that allows measuring distance between two points.

_____ 10.   Right triangles exist.

Q2   24 points

You are in a science experiment. You will be parachuted into one of the Big Three spaces. Euclidean, Spherical or Hyperbolic. You will have oxygen and a magic protractor and a magic ruler. The protractor and ruler work in all three spaces perfectly. There are geometric objects scattered over the landscape. The escape pod that returns you to your home works only when you key in the name of the space you are in and you only get one choice. How will you figure out in which space you landed?

Q3   16 points

Given the following axiomatic system:

The Five Point Geometry

Undefined Terms: point, line, on

Axioms: A1   There are exactly 5 points.
                            A2   Each two distinct points have exactly one line on
                                  both of them.
                            A3   Each line has exactly two points on it.

Definitions: parallel lines share no points

Theorems: There are 2 small theorems.

Sketch a model and tell how many lines are in your model. Label the points with letters
of the alphabet.

Write a brief essay that compares and contrasts similarity transformations and isometries.

Q5   What is geometry?   20 points

Extra Credit   10 points

Discuss if there are parallel lines in your model for Question 3. Is the geometry more like Euclidean, Spherical, or Hyperbolic with respect to having a line and a point not on the line…how many parallel lines go through the point?