Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use the results of discussion, a text, notes, or technology. **Only write on one side of each page.**

“The good Christian should beware of mathematicians and all those who make empty prophesies. The danger already exists that the mathematicians have made a covenant with the devil to darken the spirit and to confine man in the bonds of Hell.” – Saint Augustine (from page 209 of Greenberg)

Problems

1. Do one (1) of the following.

   (a) Using any result through Chapter 5 and any previous exercise, do exercise 20 on page 171 of Greenberg. Note that this is a problem in Euclidean geometry rather than neutral geometry.

   (b) Using any result through Chapter 5. Prove that Euclid’s fifth postulate implies Wallis’ postulate.

2. Do one (1) of the following.

   (a) Using any result through Chapter 5 and any previous exercise, do exercise 11 on page 168 of Greenberg. That is, find and explain the flaw in Gergonne’s attempted proof of the parallel postulate.

   (b) In neutral geometry, let $E$ denote the Euclidean parallel postulate and $H$ denote the hyperbolic parallel axiom. Show that any statement $S$ in the language of neutral geometry that is a theorem in Euclidean geometry and whose negation is a theorem in hyperbolic geometry is equivalent (in neutral geometry) to the parallel postulate. [This is a slick way to find statements that are equivalent to the parallel postulate.]