Math 304 - Dr. Miller - Exam #3, Spring 2016 - Wednesday, Apr. 27, 2016

1. *[25 pts]* State and prove ASA.

2. (a) *[15 pts]* Prove the AIP Theorem, which says that if two lines are cut by a transversal such that a pair of alternate interior angles is congruent, then the lines are parallel.
   (b) *[10 pts]* State your choice of three other results (corollaries) that related tranversals, angles, and parallels. You need not prove them.

3. *[15 pts]* Prove this Saccheri-Legendre lemma: for any $\triangle ABC$, there exists another triangle $\triangle A_1B_1C_1$ whose interior angle total equals that of $\triangle ABC$, but where $m(\angle A_1) \leq \frac{1}{2}m(\angle A)$.

4. (a) *[5 pts]* State the Angle Bisector Theorem.
   (b) *[5 pts]* Draw a precise angle, then CONSTRUCT its bisector using straightedge and compass. Leave all construction marks in place.

5. *[10 pts]* Draw a precise triangle on plain paper and construct its circumscribed circle. Leave all construction marks in place.

6. *[15 pts - 5 each]* On separate pieces of patty paper, write your name (in case they get lost!) and perform each task. Clearly indicate your answer for each task on the patty paper itself. Staple them at the back of your exam when you hand it in.
   (a) Draw a precise angle and fold to construct its bisector.
   (b) Draw a non-horizontal line labeled ℓ across the entire piece of patty paper, and place a point labeled P somewhere away from your line. Fold to construct a line through P that will be perpendicular to ℓ.
   (c) Draw a precise, non-isosceles triangle and label its vertices A, B, C. Fold to construct the median to side $\overline{BC}$.