MA202:004 Problem set 8

April 26, 1999

Below is yet another set of fun and exciting mathematics problems. I hope to complete these before our third test on Thursday, April 20.

The most relevant sections in the text are sections 10.3 and 10.4.

1. In the country of Siete there are 15 towns, each of which is connected by roads to at least seven other towns. Prove that one can travel from any town to any other town, possibly passing through some towns in between.

2. A soccer league has 7 teams in two divisions, one division with 4 teams and one division with 3 teams. Each team plays 10 games.

   (a) How many games are played by all the teams over a season?

   (b) In preparing the schedule, the league director would like to have each team play exactly two games against each opponent in the same division. Is this possible?

3. Recently Major League Baseball expanded to thirty teams and we now have 14 teams in the American league and 16 teams in the National league. Why is it not a good idea to put 15 teams in each league? (It is my understanding the Major League Baseball had planned to put 15 teams in each league. When they began to write the schedule they realized that this was not practical.)

4. In the regular season, each of the thirty Major League baseball team plays 162 games. How many regular season games are played? (Ignore strikes, rainouts, earthquakes, etc.)

5. We know, that the angles in a triangle sum to $180°$. Draw a four sided polygon (or quadrilateral) and divide it into triangles. What is the angle sum in the quadrilateral you drew? Repeat with five, six and seven sided polygons. Guess a formula which tells us the sum of the interior angles in a polygon with n sides. The answer should depend on the number of sides. (You can check this by looking in Chapter 10.)

6. A common pattern for a soccer ball is to have it covered by hexagons and pentagons so that two hexagons and one pentagon meet at a point. (See the picture on the board.) Can this happen in the plane? Explain.