Homework #4

1. [1] Assuming all our averages stay the same, what grade do you need on the final exam to earn a 2.0 in the course?

2. [2] What object in the table on page 76 is $\mathbb{P}^2 \# S^2$ topologically equivalent to?

3. [3] Match each surface on the left to a topologically equivalent on on the right.

   $\mathbb{K}^2$ $\mathbb{T}^2 \# \mathbb{P}^2$

   $S^2 \# S^2 \# S^2$ S^2

   $\mathbb{K}^2 \# \mathbb{P}^2$ $\mathbb{P}^2 \# \mathbb{P}^2$

4. [5] Construct a set of diagrams showing:

   - $\mathbb{T}^2 \# S^2$ is topologically equivalent to $\mathbb{T}^2$
   - $\mathbb{P}^2 \# \mathbb{P}^2$ is topologically equivalent to $\mathbb{K}^2$

5. [3] Find the sum of angles in all "triangles" appearing in figure 9.2.

6. [3] Can you make a rectangle on the sphere? If so draw a picture of it and if not, explain why you cannot.

7. [3] Can you find a technique to make a geodesic parallel to a given one on the sphere? *Justify* your answer.