DEPARTMENT OF MATHEMATICS

MATHS 190 Lecture 19 Summary

Rubber sheet geometry (or, as it is usually called, Topology) is the study of shapes up to equivalence by distortions which are allowed to stretch, shrink, bend or twist but not cut or glue. For example, the letters E and F are equivalent by distortion, whereas A and B are not.

We saw some surprising results in topology, namely that you can remove your vest without removing your jacket, and that you can detach a ring in a certain configuration from one of the holes.

We also saw how to prove that the sphere is not equivalent by distortion to the torus (i.e., doughnut). The important idea in this proof is to find an intrinsic property of the shape which does not change when the shape is distorted. This idea can be used often in solving problems.

Before you come to the next lecture: You should spend an hour or two thinking and reading about the ideas presented in the lecture. You should also:

- Read sections 5.1 and 5.2.

Other activities you could do if you have time are:

- Think about how to show that a "two-holed doughnut" is not equivalent under distortion to a single holed doughnut.
- Read (for example, on Wikipedia) about the Poincaré conjecture, the million dollar prize and Grigori Perelman's indecision about whether to accept the prize.