PROJECT TITLE

DIFFERENTIAL GEOMETRY, SPRING 2015

Central Theme

Discuss truly geometric characterizations of the Gaussian curvature.

Minimum Requirements

Write a paper exploring three characterizations of Gaussian curvature.

- 7-10 pages, in LaTeX, with attention paid to standard English grammar, spelling and usage.
- Give a clear definition of Gaussian curvature
- Use several examples including the sphere, the helicoid, and a cylinder.
- Include images where appropriate.
- Show that the Gaussian curvature is the "infinitesimal area expansion factor" for the Gauss map.
- Show that the Gaussian curvature helps measure the growth rate of the circumferences of small circles about a point.
- show that the Gaussian curvature helps measure the growth rate of the area of little disks about a point.

Resources

Struik has some of this material near page 136.

Another reference is do Carmo's *Differential Geometry of Curves and Surfaces* near pages 153 and 283.