ENVELOPES OF PLANES AND RULED SURFACES

DIFFERENTIAL GEOMETRY, SPRING 2015

Central Theme

There are special cases of surfaces that are interesting: Ruled surfaces, which contain enough straight lines so that there is a line in the surface through each point; and surfaces built as envelopes of families of planes.

Minimum Requirements

Write a paper exploring the basics of these special classes of surfaces built by using constructions with curves.

- 7-10 pages, in LaTeX, with attention paid to standard English grammar, spelling and usage.
- Give a clear definition of each of these classes.
- Compute several examples.
- Include images where appropriate.
- Prove the basic classification theorems for ruled surfaces and developable surfaces.

Resources

Shifrin has a discussion of ruled surfaces and the classification theorem in section 2.1 exercise #12.

Struik has a good discussion of developable surfaces as section 2-4.

Another good reference is do Carmo's *Differential Geometry of Curves and Surfaces* chapter 3-5.A.