Differential Geometry of Curves and Surfaces

Homework 12

Due on December 21

1. A compact surface S with Gauss curvature K can be decomposed into finitely many hexagons (that is, images by some parameterization of Euclidean hexagons) whose intersections are precisely a common edge, such that exactly three edges meet at each vertex. Compute $\int_S K$.

2. Show that the **helicoid**, defined as the image of the parameterization $\mathbf{g} : \mathbb{R}^2 \to \mathbb{R}^3$ given by $\mathbf{g}(u, v) = (u\cos(av + b), u\sin(av + b), v)$ (where $a, b \in \mathbb{R}$ are constants), is a minimal surface.