1. Compute Gaussian curvature at the points of the torus covered by parametrization:

$$((a + r\ cos\ u)cos\ v, (a + r\ cos\ u)sin\ v, rsin\ u)$$

Determine parabolic, hyperbolic and elliptic points.

2. Consider parametrized surface:

$$(u - \frac{u^3}{3} + uv^2, v - \frac{v^3}{3} + vu^2, u^2 - v^2)$$

Computes coefficients of first and second fundamental forms, principal curvatures, lines of curvature and asymptotic curves.

3. Show that the mean curvature H at $p \in S$ is given by:

$$H = \frac{1}{\pi} \int_0^{\pi} k_n(\theta) d\theta$$

where $k_n(\theta)$ is the normal curvature at p along a direction making angle θ with a fixed direction.