

**MATH 436
HOMEWORK 8
DUE NOVEMBER 13, 2007**

(1) Let

$$\sigma(u, v) = (u, \cosh(u) \cos(v), \cosh(u) \sin(v)).$$

Compute the Gaussian and mean curvatures of σ .

(2) Suppose T is a torus in \mathbb{R}^3 . Show there is a point $x \in T$ with Gaussian curvature $K < 0$ at x .

(3) Suppose that γ is a curve on a surface S with normal curvature $\kappa_n = 0$. Show that the Gaussian curvature K of S satisfies $K \leq 0$ along γ .

(4) Let σ be a patch, and x a point on σ . Suppose that the unit normal \mathbf{N} at x satisfies $\mathbf{N}_u = \sigma_v$ and $\mathbf{N}_v = -\sigma_u$. Compute the Gaussian and mean curvatures of σ at x .