HW 6 - Analytic and Differential geometry 88-201

Submission deadline: May 28, 2025.

1. Given the parameterization of a torus formed by revolving a circle of radius 1 centered at $(2, 0)$ in the xz-plane around the z-axis:

$$X(\theta, \phi) = ((2 + \cos\phi)\cos\theta,\ (2 + \cos\phi)\sin\theta,\ \sin\phi)$$

   Let:

$$E = \left[0, \frac{\pi}{2}\right] \times [0, \pi], \quad D = \left[0, \frac{\pi}{2}\right] \times \left[0, \frac{\pi}{2}\right]$$

   Compute the areas of $X(E)$ and $X(D)$.

2. Compute the Gamma symbols of the unit sphere and of the cylinder defined by $x^2 + y^2 = 1$. Present each surface with a suitable parametrization.

3. Given the hyperboloid:

$$(\cosh\varphi\cos\theta, \cosh\varphi\sin\theta, \sinh\varphi)$$

   Compute the first fundamental form and the Gamma symbols.