

## Riemannian Geometry IV

### Problems, set 7.

**Exercise 18.** Let  $\mathbb{H}^n = \{(x_1, \dots, x_n) \in \mathbb{R}^n \mid x_n > 0\}$  denote the upper half space model of the hyperbolic space with its standard Riemannian metric

$$g_x(v_1, v_2) = \frac{\langle v_1, v_2 \rangle_0}{x_n^2},$$

where  $v_1, v_2 \in T_x \mathbb{H}^n \cong \mathbb{R}^n$  and  $\langle \cdot, \cdot \rangle_0$  denotes the standard Euclidean inner product. Calculate all the Christoffel symbols  $\Gamma_{ij}^k$  with respect to the canonical global coordinate chart  $\varphi : \mathbb{H}^n \rightarrow V \subset \mathbb{R}^n$ ,  $\varphi(x) = x$ .